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Private Gas Works.

The great advantage of gas-light in point of convenience, cleanliness and economy over other methods of artificial lighting is too apparent to the most benighted individual to require argument or explanation, when compared with the old-fashioned whale oil drips, "tallow dips," or the more modern and greatly improved petroleum and kerosene lamps of the present day.

Lamps must be filled and trimmed, and always require more or less attention, and even in this scientific, mechanical, and otherwise enlightened age, every one does not know how to manage a kerosene burner and lamp; and those that have the necessary scientific and mechanical attainments, do not crave the recreation, and the adjuncts of burned and soiled fingers and raiment involved in said necessitous occupation.

Gas requires no ingenuity. It is always ready, and only requires the magic "Sesame" of a touch to throw forth its brilliant rays for the benefit and complete satisfaction of its patrons. In this connection we herewith present an illustration of George H. Kitchen & Co.'s new "Patent Gas Generator."

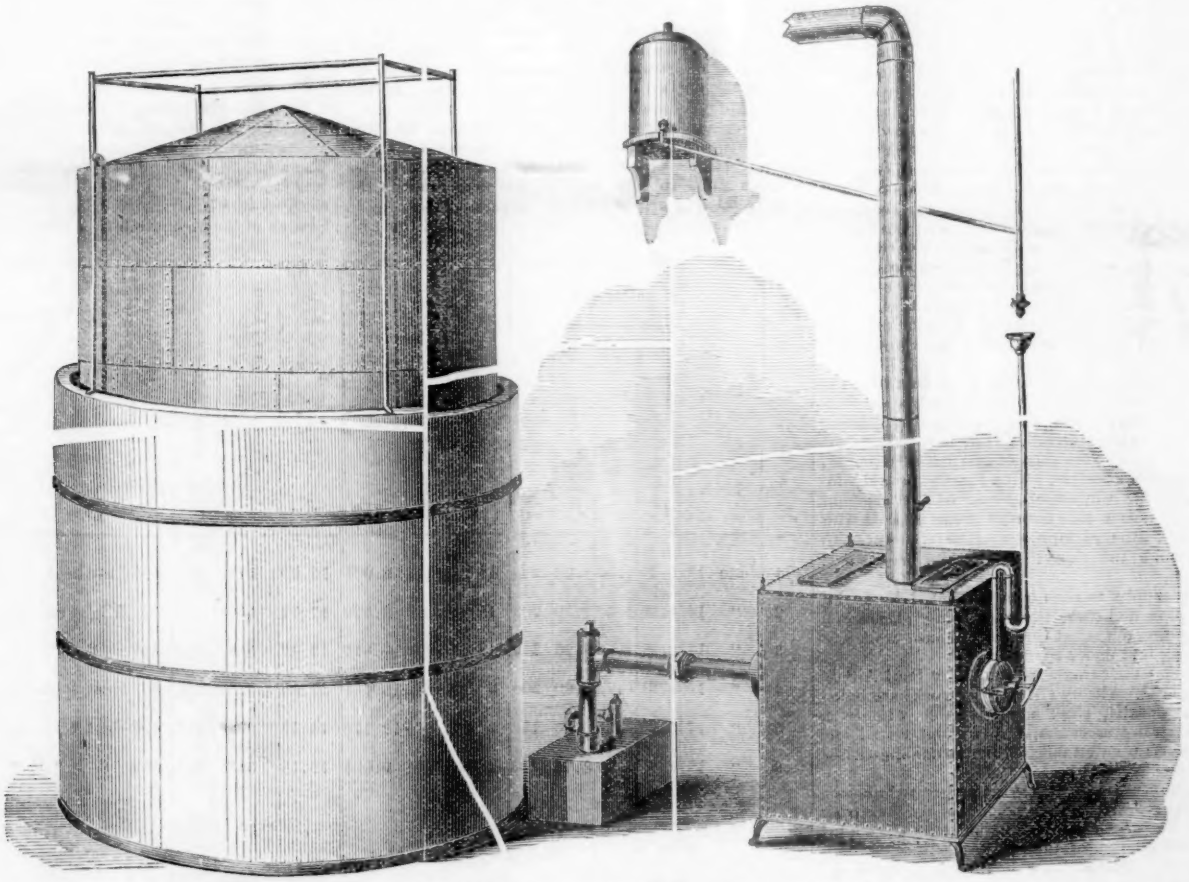
In this apparatus kerosene or petroleum is distilled in combination with wood, and converted into a fixed gas of great purity, which gives a light superior in brilliancy and beauty to ordinary coal-gas.

The apparatus, as will be observed, consists of an elevated oil receptacle communicating by a tube and siphon with the small retort in a common box-stove, or furnace. Here it is decomposed by a temperature of 800° Fahr., in combination with wood, with which the retort is first charged, and the resultant gas is conducted into the condensing box at the left, and thence to the gas meter. This completes the process, excepting distribution, which is done in ordinary gas pipes and fixtures, to the different points of combustion.

The gas is free from the impurities and disagreeable odors of coal-gas, and is exceedingly simple to manufacture and prepare fot use, because it requires no purification.

For private residences, hotels, factories, and even small communities, this apparatus seems to be exceedingly well adapted, and is meeting with much success.

George H. Kitchen & Co., patentees, 591 Broadway, manufacture and put up this apparatus, of whom further information may be obtained.



GEORGE H. KITCHEN'S PATENT GAS GENERATOR.

Petroleum for Steamship Boilers.—After careful and long-continued trials, the Secretary of the United States Navy finally reports against the employment of petroleum as a fuel in steamships. He says: "The act approved April 17, 1866, appropriated five thousand dollars for testing the use of petroleum as a fuel for marine boilers. An elaborate series of experiments has been made at the New York and Boston Navy Yards. The conclusion arrived at is that convenience, comfort, health and safety are against the use of petroleum in steam vessels, and that the only advantage thus far shown is a not very important reduction in bulk and weight of fuel carried."

Practical Management of Gas Works.

[WRITTEN EXPRESSLY FOR THIS JOURNAL.]

NUMBER FOUR.

[Notwithstanding the request which has been editorially made by this Journal for records of results and individual theories, the managers and companies of the country, as a general thing, seem apathetic and reticent. From this fact, these articles depend for their closeness and scope upon my own experience, and the official records which the frank courtesy of one of our immense New York companies has placed at my disposal. Accurate, so far as I go, and sincere, I believe myself to be; but I had hoped to converge the *whole* practice of the country to a single focal value, and venture to make this personal appeal for co-operation before believing my task to be as thankless as it is unremunerative.—J. R. S.]

In settings of fives (and not unfrequently of threes) the top of the ash pan is placed below the level of the floor. It is therefore necessary to protect the side of the slope by sheets of $\frac{3}{8}$ inch boiler-plate, unless the better expedient is adopted of a substantial cast-iron trough whose vertical sides increase in depth from nothing to 10 or 12 inches, suitably strengthened by exterior ribs on all three of its sides.

It is well to weld a collar on each grate-bar at such point as that it shall fit against the front of the back bearer, and this is especially useful where the late improvements are adopted of dropping the back bearer one course below the other, and so raising the whole grate system, *relatively to the door-frame* as to afford the means of shaking or removing the bars only through the door-opening. And again: In freeing the back of the furnace from clinkers, the course against which the bars set is unavoidably destroyed, and the bars would gradually slip back so as to lose their grip on the front bearer, but for these collars.

It is difficult to explain the intricacies of bench-setting without illustrations which are impossibly expensive to the writer, but any manager who has set clays in a skeleton constructed for irons will see how valuably the last device acts by enabling the bottom retorts to be set 1½ courses lower without affecting the *average* depth (or effective capacity) of furnace, or obstructing access to the ash pit. The old-fashioned clinker-bar is reduced in weight more than one-half, and the heavy chisel bars which are used for slicing off the accumulated clinker are guided and supported upon substantial wrought iron stools, say one to each ten settings. When it is necessary to remove the grate bars, which is often the case, they are handled by means of bent tongs, and drawn entirely from their place through the door.

It usually occurs in the change from iron to clays that the ash-pan needs to be lowered, and in some instances this lowering of the pan renders it very difficult of cleaning by the old methods. Here it is well to use a flat, shallow shovel, with sides of two inches in height, having a perforated bottom, and a handle suitably inclined for reaching the extreme rear of the ash-pan. Being only 10 inches wide over all it can be used with great facility;—the perforations allow the water to drain out, while the shovel retains the breeze and ashes.

The water-supply to each pan is effected by an independent pipe and cock, the cock being placed in a convenient position against the retort-house wall, and the pipe being laid under the floor.

The door and door-frame patented by Paul A Sabbaton, Esq., of the Albany (N. Y.) gas works are indispensable in working clay, and advisable with iron, retorts;—a strong assertion, but a disinterested one whose truth has been established by the unimpeachable test of practice.

The mouth-pieces may with great propriety have one or more "claws" of two inches clear projection from the flanch, by which its weight shall be suspended from the solid portion of the retort shoulder, and not from the bolts. These claws should not be above the slots which receive the bolts.

The malleable iron retort-lids manufactured under the Floyd patent at the Oregon Foundry, New York city, are justly considered as most valuable by every well-ordered gas company. They weigh, for a 20 x 12-inch mouth-piece, only about 30 lbs. each, while the ponderous cast iron lids formerly in use weighed 50, 60, or even 84 lbs. apiece. If any of my readers be incredulous as to this last enormity of weight, let them turn to the very interesting report of the Richmond (Va.) gas works for the year ending February 29th, 1856.

Superadded to the advantages of lightness, other and not less powerful arguments exist in favor of the malleable iron lids. In the annealing process they acquire a toughness nearly as great as wrought iron, while they preserve all the stiffness and accuracy of shape of cast. Hence, their durability is far greater than that of those made of old material; and except from the snapping off of the projecting handles, there is hardly a limit to their period of service. If a handle do break, a few rivets and a little labor in the blacksmith shop serve to replace it. This application of malleable iron appears to be totally unknown in England.

The cottars I always construct with a substantial square-threaded screw of one quarter inch face on each of its three sides, the cross-bar swinging permanently by its eye upon a set pin attached in the usual way to the *outside* lug of the mouth-piece. With a screw of such pitch as this, the closing of the lid is more rapidly effected than where the fine V-threaded screw is employed; and there is no danger of driving the lid to pieces by the enormous accumulated power in the old screw. This I have seen more than once. The cottar is always handy, and is always self-adjusting to the boss, or center, of the lid; and the thread is not hammered out of shape by constantly falling upon the floor, as is the case with the ordinary shifting bars. Even in benches of fives they are used to advantage; the cottar-bars of the two bottom retorts swinging *underhanded*, and having sufficient play in the eye to clear and rest upon the studs of the bottom mouth-pieces in the adjoining benches. The speed with which they are worked is very advantageous where large clay retorts are charged with the shovel, which is a bad plan enough, be it observed.

One slight objection to the use of retorts with a contracted mouth is the difficulty of hauling the charge. Keller's retorts (of the 20 x 12 pattern) tapered one inch in their length, being only 19 inches wide at the back, and many managers will remember the beautiful coherence of the coke, in one clean cake, as it passed the mouth-piece, and the satisfying rapidity with which they were worked. We now attach a 20-inch mouth-piece to a retort 26 inches wide in the body, and in one instance the contraction is actually from 40 inches to 24 inches.

My own creed is, that retorts of 26 inches or under ought to have a mouth-piece area equal to their greatest internal cross-section, and that *all* retorts should be tapered inside from mouth to back. The compelling the fragile retort to carry additional weight is no objection, for the area of the supporting face and the number of bolts are proportionately varied.

In working clay retorts, especially when of large size, a feature is observable which necessitates stand-pipes of larger calibre than when using irons. I refer to the accumulation of the naphtha compounds in the stand-pipe, which annoyance is unquestionably due to the intense heat applied to clay retorts, and the consequent rapidity with which the gas is evolved. These causes react upon each other to choke the stand-pipe as well at its mouth-piece orifice as for some distance above it, and it is to be hoped that no new works will be constructed with connections to the hydraulic main of less than six inches internal diameter. It has been mentioned that the "Continental Gas Company," of Europe, avoid stoppages by throwing a minute flow of water over the bridge-pipe plug, so graduated as to permit the complete evaporation of the water, as it trickles down, before it reaches the mouth-piece. This simple device has never, to my knowledge, been adopted by any American engineer.

Independent, however, of this tendency to stoppage, another consideration, in the absence of an exhauster, calls for the enlargement which I advocate; which consideration is the rapid formation of carbonaceous deposite due to the back-pressure of an obstructed flow. A clay retort at high temperature is at best very receptive of the hydro-carbons, and no means are to be neglected which go to diminish pressure, which is the main agent in their deposition. In a casual stroll through the Brooklyn Gas Works a fortnight since, I observed that Mr. Havens uses 8-inch stand-pipes to his immense 40-inch retorts, which gives about the same ratio of delivery as a 6-inch outlet would to a 20-inch retort.

These articles are, of necessity, more or less colloquial in their structure, and I shall offer no apology for any little inversion of due rhetorical order in inserting here the following conclusive evidence of the effect of pressure. At the worst, I have crawled from casting to casting until I am not so *very* far from the exhauster—near enough to make suitable obeisance to it and to my readers. Quitting this nonsense, here is an extract from Mr. Jos. A. Sabbaton's note-book:

"ADVANTAGES OF AN EXHAUSTER WITH CLAY RETORTS.
December 10th, 1863. 18th Street Station.

"Owing to the engine being idle for repairs to the "boiler, the exhauster was not in operation during 3¼ "days. The amount of gas manufactured was by this "reduced 115,000 cubic feet per day, the average make "before the exhauster was stopped being 1,618,000 "cubic feet per day. This would show a difference in "favor of the exhauster of about 7 6-10 per cent., or "722 cubic feet per ton. After the exhauster was "again started, the average daily make (during a period "of five days) was 1,665,000 cubic feet per day. This "would show a difference in favor of the exhauster of "about 162,000 cubic feet, or 10 7-10 per cent., equal "to 1,016 cubic feet to the ton of coal

"Taking the mean of the two trials, the difference in "the yield of gas, when clay retorts are used, may be "taken at 9 per cent. I do not think that it would in "any case be less than 7 per cent. The daily amounts "of coal used in each of the three observed periods va-"ried but a few pounds, and the inlet guage to the ex-"hauster showed equal vacua during the first and last "of the trials."

In seeking to enforce the importance of high heats, I append a tabulated and exact statement of experiments at various distillatory temperatures. The retort used was a full sized iron, 20 x 12, and the entire apparatus was of sufficient size for the treatment of 200 lbs. to a charge,—the experiments being made in the 18th street Station of the Manhattan Gas Works:

No. of trial.	Date. 1860.	Anal. of Gas. Olefiant Gas.	Hydro-carbon Vapors.	Carbonic Oxide.	Lbs. of Coal.	Time.	Cubic feet of gas produced.	Cubic feet per ton of 2,240 lbs.	Candle Power.	Equivalent of 1 ton of Coal in lbs. of Sperm.	Temperature Fahr.	Specific gravity of Gas.	Remarks.
1	June 13.	5.75	.75	9.00	200	4° 50′	804	9.004	16.60	512	70°	504	Low heat.
2	" 14.	5.50	1.50	8.50	200	4°	850	9.520	17.77	580	70°	515	Bright red heat.
3	" 15.	6.50	.75	8.25	200	4°	894	10.012	17.42	598	70°	517	" " "
4	" 16.	6.25	.75	9.00	200	3° 30′	932	10 438	17.57	627	70°	503	Heat somewhat higher.
5	" 17.	5.25	.25	9.00	150	3° 40′	815	12.170	15.19	634	70°	491	Heat very high.
6	" 18.	7.00	1.00	8.75	200	2° 15′	804	9.004	19.18	593	70°	539	" " "
Anal. of Coal.—Volatile matter						39.2			[Beaver Coal.]				
		Coke.....				60.8							
						100.							

It is proper to remark that the calculation of the sperm equivalents of the ton of coal is my own, and that I have interpolated it in Dr. Torrey's valuable table so as to focalize the two results of gas-volume and candle-power; in other words, to show at a glance the economic values of the different temperatures employed.

The lessons taught by this table are conclusive in favor of the theory of high heats and short charges, and carry so plainly their own moral to any careful reader, as to render comment unnecessary.

It would be partisanship to withhold the results of some experiments elicited by an almost forgotten controversy had through the columns of the London Journal, the more as these experiments go by singularly independent testimony to confirm later and more scien-

tific tests made by the late Henry Banister, C. E., and recorded in his exquisite book upon the manipulation of the gases from coal.

After alluding to the fact that the invisible leakage from clay retorts is greater than from irons, "Aluminium Ferrum" (L. J. G. L. vol. I. p. 69 goes on to say:

"To account satisfactorily for this leakage, one retort "of each kind was selected as a sample, and a three-"quarter pipe was connected to the mouth piece "through which gas was admitted into the retort; the "lids being luted over, and the gas passing into the "retort being measured through a meter, the quantity "absorbed or leaked was thus ascertained * *

"The result of this trial was that the iron retort, "under 9-inch pressure, absorbed 4 feet per hour; and "as a single retort would take 60 hours to carboni-"ize a ton, this would have amounted to a loss of 400 "feet per ton. The clay retort, at the same pressure, "leaked 21 feet per hour, or 1260 feet per ton.

"The clay retort was then tested under pressrue, "and the loss was only 5 feet per hour. Now, the "leakage of gases through orifices is well known, under "different pressure, to follow the law of being directly "as the *square root* of the head of water pressing upon "them. In this case it was not so, but *directly as the "head of water*—a contradiction to a general rule so "important that it requires other experiments to sub-"stantiate its truth."

Now, this contradiction *has* been substantiated, and the recognized law of deliveries is utterly subverted, so far as *minute* orifices are concerned.

But I regret that no later experiments upon the leakage through clay fabrics of improved construction have ever come to my knowledge. There is an error in the deductions, as I have quoted them, which I prefer to attribute to a vagary of the printer rather than to A. F.'s innocence of the multiplication table. So I will only say that I very much doubt whether a clay retort such as is now made, *after its pores are infiltrated with carbon*, will show anything like three times the loss due to iron.

JAMES R. SMEDBERG.

SUPPLEMENT TO THE "PRACTICAL MANAGEMENT OF GAS WORKS."

	Name of Company.	Gas per ton during 1867.	Gas p'r day per retort during 1867.	Retorts used.	Gas made during 1867.
		Cub.Ft.	Cub.Ft.		
1	Albany.....N. Y.	9.162			92,000,000
2	Albion.....N. Y.	8.000	2.461	Iron.	2,200,000
3	Adrian.....Mich	8.000		Clay.	5,000,000
4	Batavia.....N. Y.			Iron.	2,500,000
5	Bath.....Me.	7.600		Clay.	2,400,000
6	Charlestown.....Mass.	8.000	3.840	Clay.	33,200,000
7	Clinton.....Mass	8.856		Clay.	4,200,000
8	Cleveland.....O.	8.323	3.488	Clay.	72,500,000
9	Elizabethtown....N. J.	10.250		Clay.	11,200,000
10	Fort Wayne.....Ind.	11.670	4 418	Clay.	12,100,000
11	Galena.....Ill.	6.000	3.400	Iron.	2,600,000
12	Grafton.....W. Va.	8.000	5.500	Clay.	700,000
13	Hudson .....N. Y.	9.900		Clay.	5,000,000
14	Hamilton... ....C. W	8.000	4.000	Clay.	14,600,000
15	Lynchburg.....Va.			Clay.	5,360,000
16	Mount Holly.....N. J.			Both.	1,200,000
17	Mauch Chunk.....Pa.			Iron.	2,100,000
18	Manchester.....N. H.	9.790	3.660	Clay.	26.100,000
19	Norfolk.... .....Va.	7.000		Clay.	11,500,000
20	N. Attleboro'....Mass.	8.744		Clay.	3,000,000
21	Ogdensburg.....N. Y.	8.300		Iron.	4,500,000
22	Pittsfield.....Mass.			Clay.	4,500,000
23	Rochester.....N.Y.			Clay.	52,000,000
24	Rockford..... ....Ill.	7.000	3.200	Iron.	4,100,000
25	Seneca Falls.....N. Y.	8.800		Clay.	5,700,000
26	Salem. .....Mass.			Clay.	19,100,000
27	Scranton.....Pa.	8.400	4.000	Clay.	8,000,000
28	Toledo.....O.	9.744	4.000	Clay.	22,400,000
29	Trenton..... .N. J.			Clay.	13,000,000
30	Wilkesbarre.... ..Pa.	8.500		Iron.	8,500,000
31	West Chester.....Pa.	9.000	4.328	Iron.	6.000,000
32	Warren.....R. I			Iron.	1,300,000
33	Williamsburg.....L. I.	9.534	4.162	Clay.	78,400,000
34	Yonkers.....N. Y.	9.360	4.400	Clay.	10,500,000

The New Gas-Light.

[Translated expressly for this Journal from the Paris "Petite Presse," of 10th ultimo.]

The trials of the new system of lighting by means of super-oxygenated gas, conducted in the square fronted by the Hotel de Ville, and to which the *Petite Presse* referred about a fortnight since, have served to produce the most profound sensation in the capital. Our whole population have been eager to see this light, whose brilliancy is almost as dazzling as that of the electric light itself—which enables us to read a newspaper or a letter at a distance of twenty-five paces from its focus—which is not characterized by those interruptions and violent transitions which have rendered it hitherto impossible to employ electricity in every day practice, and which possesses the advantage of fabulous economy in a higher degree than any other known to us.

The Emperor wished to satisfy himself personally of the truth of the facts stated by the Parisian journals. For two days his apartments, as well as those of the Empress have been lighted by the new process. He caused the two inventors, Messrs. Maréchal and Tessier du Mothay, to be summoned to the Tuileries; and these gentlemen, of course, cordially hastened to remove their apparatus from the Hotel de Ville to the Imperial Palace. The trial was most successful, and we are informed that their majesties could not have been better satisfied with its results.

"We believe you," our readers will say, "but do "you know what this new method of illumination is? "Is it a mystical discovery—a secret which cannot be "unveiled? Are you acquainted with the manipula-"tion of this *super-oxygenated* gas, as you call it?"

Nothing is at the same time so simple and so ingenious. Every one knows that ordinary lighting gas is hydrogen, obtained by distillation from oil or mineral coal. This inflammable gas is purified in appropriate apparatus, and stored in great iron receivers known as gas-holders; from these it passes through pipes to the burners of the street lamps and houses, where its delivery is controlled by the opening or shutting of a simply-constructed cock.

Chemists have long since ascertained that the union of oxygen and hydrogen gases produce a pallid and non-luminous flame, which throws off, however, the most intense heat—a heat incomparably greater than that derivable from any other combustible substance; and they employ this oxygenated hydrogen for their tests and analyses with the blowpipe.

An English expert, Mr. Drummond, one day conceived the device of plunging into this flame a piece of chalk, such as is used for figuring upon the black-boards in our schools. The heat of the flame was so intense that it at once carried the chalk to a glittering incandescence which shone like the sun, and gave out a thousand times the brilliancy afforded by any lamp, candle, or wax light now known.

This is the light which all Paris has witnessed in the square of the Hotel de Ville, and of which the Emperor has made trial in his own drawing-rooms.

"What a charming miracle!" you will exclaim. "Why has it not been utilized during the forty five years which have elapsed since its discovery by Mr. Drummond?"

One moment, dear readers.

To make oxygenated hydrogen (or "oxy-hydrogen," as the members of the Academy of Sciences call it) involves the production of two gases: hydrogen, which is cheap enough, and oxygen which until now was very dear. And here we arrive at the invention of Messrs. Maréchal and Tessier du Mothay.

Without entering into the technical details of the production of oxygen, we will at once mention that our new inventors obtain to-day, at 72 centimes per cubic metre (39 cents per 1000 cubic feet) that very oxygen gas which previously cost at least seven or eight francs ($3.75 to $4.25 per 1000 cubic feet) and over, under conditions which were not practicable on a manufacturing scale. Here you have the invention or, if you prefer the term, the application. As the source of cheap oxygen Messrs. Tessier du Mothay and Maréchal have selected the manganate of soda. Their apparatus is very simple, and the mode of its manipulation very ingenious.

We proceed to describe it. In the first place a reverberatory furnace heating seven retorts having a capacity, each, of about 150 kilogrammes (330 lbs.) of the manganate of soda. In addition to this, a boiler, a condenser, a steam engine, a blower, and two gas-holders holding about 15 cubic metres (530 cubic feet) each.

These items of apparatus are erected in the vaults of the "Assistance Publique" at the Hotel de Ville, where any one can visit them.

The steam is superheated to about 450 deg. (Centigrade, we presume—equal to 842° Fahr.), and then by a suitable arrangement is suffered to enter the first retort. Thus brought into contact with the superheated steam, the manganate of soda becomes decomposed, and relinquishes its oxygen, which is swept off into the condenser by the steam. The condenser is full of wet coke which condenses the watery vapors, and permits the oxygen to pass to the gas-holder, ready for use,

When a retort has been stripped of oxygen, manganese and soda remain behind. The steam jet is arrested, and immediately replaced by a current of cold air thrown into the retort by a powerful blower driven by the engine. Thus brought in contact with the air, which, as we all know, contains 21 per cent. of oxygen, the manganese is again oxidized, and recombines with the soda to form again the manganese of soda. The same process may be renewed indefinitely, the same substances always producing oxygen.

By means of separate tubes, the oxygen from the gas-holders in the vaults, and the hydrogen from the ordinary gas mains are led to the burner; they are brought into contact at the point of lighting, and their flame is directed against a piece of magnesia which instantly throws out the magnificent brilliancy which all Paris has admired.

The inventors have advantageously substituted magnesia for the chalk which Drummond employed.

Great care must be taken not to allow the two gases to traverse the same pipe or gas-holder, for the mixture is terribly explosive, although the mere fact of their meeting at the point of ignition involves no risk whatever.

We will close this article by a few figures;

The method discovered by Mr. Tessier du Mothay of obtaining oxygen affords that gas at a cost of 72 centimes per cubic metre (39 cents per 1000 cub. feet).

The question of economy then reduces itself thus:

Three cubic metres (116 cubic feet) of coal gas, and four cubic metres (141 cubic feet) of oxygen, costing 8 francs 90 centimes ($1.69) give, according to photometric observations already made, as much light as 180 cubic metres (6.354 cubic feet) of coal gas, having a value of about 54 francs ($10.29). That is to say, a saving of 42 francs 10 centimes ($8.60) for equal quantities of light.

Making allowance for the necessary imperfection of newly-devised apparatus, it is not excessive to trust that it will secure us three or four times the economic advantage at less than one half the outlay.

Quality of the Gas supplied to the City of London.

Dr. Letheby reports that in the course of the quarter which expired on the 30th November last, 669 examinations were made of the illuminating power of the gas supplied to the city; each of the examinations was the mean of ten observations, and they were made in accordance with the instructions of the Act of Parliament. The following are the results:

Illuminating Power in Standard Sperm Candles.

	Great Central Gas.	Chartered. Gas.	City Co.'s Gas.
Maximum.. ..	16·52	16·36	15·69
Minimum.. ..	12·02	12·57	12·00
Average	13·96	14·31	13·75

It thus appears that the illuminating power has been constantly above the requirements of the Act of Parliament, and to the extent of about two candles. In the corresponding quarter of last year, the average illuminating power of the Great Central Gas was 13·89 candles; of the Chartered Gas, 14·19, and of the City Company's Gas, 14·17 candles, all of which numbers are close to the averages of the present quarter. The chemical quality of the gas, as regards the amount of sulphur contained in it, has not been so satisfactory, for, excepting the Chartered Gas, the quantity of sulphur has generally been excessive. This will be seen from the following table:

Grains of Sulphur per 100 cubic feet of Gas.

	Great Central. Gas.	Chartered. Gas.	City Co.'s Gas.
Maximum.. ..	34·61	26·30	30·58
Minimum	12 74	11·35	14.19
Average	21·87	11·73	22·97

In fact, of the 61 observations made during the quarter of the City Company's Gas, 42 were found to be in excess of the quantity sanctioned by Parliament. Of the 60 observations of the Great Central Gas, 41 were in excess; and of the 61 of the Chartered Gas, only 21 were in excess. The gas of each of the companies has been at all times free from sulphuretted hydrogen, and with the exception of the Chartered Gas, it has also been free from ammonia. The pressure at which the gas has been delivered to the laboratory has been rarely under an inch of water.—*Chemical News.*

—M. Mousson has discovered the interesting fact, that a powerful pressure not only retards the freezing of water, but prevents its complete solidification. The pressure opposes the tendency of the water to expand on freezing, and thus virtually lowers the point of solidification.

Purification of Gas.

[From "Clegg on the Manufacture of Coal Gas."—Fourth Edition.]

(Continued from page 227.)

Mr. Cleland, the manager of the Eccles street Gas Works at Liverpool, has patented a process which he has put into successful operation at those works, on a large scale by which the spent oxide of iron may be profitably utilized for the production of sulphur and sulphate of ammonia during the regeneration of the oxide. The spent oxide is put into closed iron retorts to which a heat, not much exceeding 660° of Fahrenhit is applied. A portion of the sulphur then combines chemically with the iron, forming sulphuret, or sulphide, of iron, and the remainder distils over as "rough" sulphur. When the latter ceases to flow, the sulphide of iron is drawn from the retort, is quenched with water, and exposed in a moist state to the air. Oxidation immediately takes place, and so vigorously that the mass must be turned and watered to prevent ignition. In the course of a few weeks the sulphide becomes changed into crude sulphate of iron, containing from 30 to 40 per cent. of sulphuric acid. This sulphate is decomposed by passing through it steam from boiling gas liquor, thus producing a mixture of sulphate of ammonia, and various iron compounds, which latter quickly change to oxide of iron. The sulphate of iron is obtained in a marketable form by the common means of lixiviation and crystalization, and the remaining material by exposure to air is oxidized and restored to its original energy for purifying gas. When a superior native oxide of iron is used, the purifying charges per ton of Wigan cannel coal, labor included, were found by Mr. Cleland not to exceed the profits derived from the product of the sulphur and sulphate of ammonia. It is important, however, to use the best oxide that can be procured, otherwise the results will not be so satisfactory.

We shall now proceed to describe the mechanical arrangements for the purification of gas, and to explain more particularly the details of the lime process.

The best lime that can be procured in England for removing the impurities from gas is that made from chalk, it being the purest native carbonate. The oolitic, the magnesian, and lias limestones are inferior exactly in proportion to the amount of earthy or foreign matter they contain. A comparison of limes is very easily made by dissolving them in diluted acid; that which leaves the least insoluble base or sediment is the best.

In preparing the lime for the dry purifiers it should be beaten, sifted fine, and water added, until, by compression in the hand, it will retain the form thus given to it. If any lumps remain their outsides alone are acted upon, and there is, consequently, a waste of material.

The quantity of lime required to effect the purification of a certain quantity of coal-gas depends principally on the amount of impurities contained in the gas. One bushel of quicklime, reduced to a hydrate, may be taken as the average quantity required to purify 10,000 cubic feet of Newcastle coal-gas; but the manager must make his own experiments as to the quantity required in his particular case. One bushel of quick-lime when slaked and reduced to the proper consistence for use, will have its bulk doubled, and that quantity will then spread over a surface of 25 square feet, 2½ in. deep, which is about the thickness found best in practice. When, however, economy is not the first consideration, the thickness may be reduced, and the surface proportionally extended, for the greater the surface the more effectual is the purification. The lime must be spread of an even thickness upon the screens, otherwise the gas will pass with greater rapidity through the thin than the thick parts, and in time work holes, so that it will scarcely be affected by passing through the screens.

Mr. Alfred King has ascertained that a much larger surface is requisite with the oxide of iron method of purification than with lime, under equal velocities of current; and he has also demonstrated that the corrosive action of the salts generated by the revivification of the oxide renders the use of wrought-iron sieves in purifiers quite inadmissible.

The forms of sieves used in purifiers are various. The French use sieves made of wicker in a frame of ¾-inch round iron. They are not very durable, but as the frames may be used over and over again, the wicker sieves are not costly, are very effective, and avoid the objection arising from the corrosion of iron by the oxide, when that plan of purification is adopted. Wooden sieves are also used, formed either of boards pierced with conical holes, or of bars mortised together and fastened with wooden pegs. Mr. Evans has invented a machine for making sieves by which a board of wood is cut by a series of chisels so as to leave alternate open spaces and bars, and the boards are afterwards joined together to the required width. Messrs. Walker made wood sieves of laths bevel in section, kept apart with distance-pieces, leaving openings about one quarter or three-eights of an inch apart on the upper face, which are expanded on the lower surface to about double the width. By this means the laths are kept clean, and a larger area is allowed for the gas to pass through. These sieves have a substantial outer frame of American oak or other hard wood; and after the laths are framed the entire sieve is strongly compressed and screwed together by bolts passing through it in three or four places. The heads and nuts of the iron bolts are let into the outside frames, and covered with wooden plugs to prevent the exposure of the iron to the destructive action of the oxide.

Wrought-iron sieves, when such are used, are made of pierced sheet-iron, about ⅛th of an inch thick, the holes being ⅝ inch diameter, punched one inch from centre to centre; or ⅝ inch round-iron rods are fixed on light angle-iron frames. When made of cast-iron, the frames are ⅞ inch square, with about fourteen bars to each foot in width; each bar being 7-16 inch on the top edge, and ⅛ inch on the bottom edge, and ⅞ inch deep. These sieves weigh about 15 pounds per superficial foot.

For the purpose of exposing a greater surface of lime to contact with the gas, it is customary in the gas works in France to place beds of moss on the trays, over which the lime is then spread. When the lime is spread upon moss, rather less than a bushel is employed per square yard of purifying surface.

In large gas-works purifiers upwards of twelve feet square are commonly used, and at the Imperial Company's works at Fulham some of the purifiers are 37 feet by 20, and 4 feet 9 inches deep. The rule to be observed in determining the size of the purifiers is, that for every 150 cubic feet of gas per hour which can be generated, each purifier should present one superficial foot of surface. In estimating the proper size of the connecting pipes of dry lime purifiers, it is a rule to make their diameters in inches equal to the square root, in feet, of the area of the purifiers.

The purifiers in French gas-works are generally made circular instead of rectangular. The usual calculation with gas-makers in France is, that an area of about one foot is required for every 250 lbs. of coal carbonized in twenty-four hours, each purifier being supposed to contain three sieves, which would amount to about three square yards of surface to each ton of coal carbonized. The lid of the purifier is made of thin boiler-plate, and has a rim all round, which dips into an annular cell, filled with water to make a hydraulic joint. The cover is lifted by handles when it is required to be removed.

Another plan of making purifiers, practised in France for the purpose of economizing iron, is to construct brick vessels, and line them with cement in the manner that the tanks of gas-holders are often formed. The brickwork, which is faced with cement three-quarters of an inch thick, diminishes towards the surface by steps which form projections for the support of the sieves. The upper part of these ledges is covered with iron. The top of the wall is also capped with iron, the two vertical parts forming the waterlute for the cover. These purifier tanks are easily constructed, and for large works, where iron is dear, they are found economical and effective.

(To be continued.)

Plumbago Crucibles.

The infusibility and, practically, the incombustibillty of plumbago were long known to chemists before practical art discovered the way to turn these valuable properties to account. At least as friable as dry clay, plumbago, unlike clay, acquires no cohesion by tempering and burning, except when mixed in powder with other substances, and in the case of plumbago pencils subjected to great pressure, although in this case no heat is applied. The use of plumbago as a material for crucibles was precluded, too, by the great price of that material, the graphite or "blacklead" of Borrowdale, having long sold for 5s. a pound, or upwards of £500 per ton. At the present time much German plumbago sells at 12*l.* per ton, and the better qualities from Ceylon hardly bring 35*l.*

The almost complete incombustibility of plumbago is the more paradoxical when we remember that, like coke and anthracite, it is nearly pure carbon, and that even the diamond volatilises when at a great heat and in contact with air. As it is, plumbago crucibles employed in melting the softest steel, or in melting glass, will withstand a very far greater number of heats than the most refractory fire-clay pots, and yet it is, at the same time, certain that steel will take up and combine a certain proportion of plumbago, as carbon, when melted with it, and possibly, too, when melted in a plumbago pot In other words, it appears to have, when highly heated, a greater affinity for iron than for oxygen.

Mr. Dixon, of New Jersey, U. S., some years ago, established the manufacture of crucibles made of a mixture of plumbago and clay, the latter in sufficient proportion to give coherence and plasticity to the whole. The manufacture was subsequently taken up in England, and is now very largely prosecuted by the Patent Plumbago Crucible Company, whose works are on the Thames, at Battersea. It was found too, in carrying on the manufacture here that a great deal of otherwise inferior plumbago required washing only, in acids, to render it fit for the best crucibles. Mr. Brodie's process consists in subjecting the powdered plumbago to a bath in twice its weight of commercial sulphuric acid, with seven per cent. of chlorate of potash, and continuing the heat until the escape of chloric oxide has ceased. This dissolves the iron, lime and alumina present, and a further treatment with fluoride of sodium removes all silica by volatilisation. The material is then washed and dried at a red heat, and finally becomes a fine powder. When boiled, too, in aqua regia, or nitro-hydrochloric acid, plumbago parts with a percentage of iron.

Until lately plumbago crucibles were made by hand, upon a potter's wheel, in the same manner as fire-clay pots. The new works of the Patent Plumbago Crucible Company, now about six months in operation, contain machinery, however, whereby the crucibles are rapidly moulded. Into a revolving iron cup is placed a plaster-of-paris mould, and within this is thrown a weighed quantity of the mixture of plumbago and clay, sufficient with a slight paring of the upper edge, to make a crucible of the intended size. The whole being in revolution, an iron arm presenting a smooth curved surface, and bent to the intended form of the crucible, is lowered vertically into the material, and is then moved slowly by means of a feeding screw towards one side of the mould, spreading out the plumbago in its course, and bringing the latter rapidly to the desired form. For this work no skilled labor is now required, and the exactness of form and uniformity of weight are better secured than by the hand process, while also the material is more completely compressed and consolidated.

The crucibles are then well dried by being left for some hours in an apartment only very moderately heated, say, to about 80°. After this they are stamped with the trade-mark of the makers, and are then burnt in a closed kiln—an operation requiring, perhaps, a couple of days, and as much longer to let down the heat, when the crucibles are ready for use. The whole process of manufacture is thus exceedingly simple.

The English makers of these crucibles have introduced them in large numbers into all the principal markets of the world, except America, which is supplied by its home manufacture. Our first engineers have repeatedly certified that, although comparatively expensive at first, the plumbago crucibles, by their greater durability, are much cheaper in the end than clay pots, however good the quality of the latter may be. Large numbers are sent abroad for steel-making, and it is a fact that, notwithstanding the prejudices of our steel-masters against plumbago, all Krupp's steel, unless it be his Bessemer steel, is melted in crucibles of this material. In Sheffield, where a steam moulding-press is now in use, at one establishment, for making fire-clay crucibles, a proportion of plumbago, although not a large one, is added, and it is not unlikely that, in time, only plumbago pots will be used in steel-smelting. —*Engineering.*

Croton Aqueduct Department.

The following table will show the amount of revenue to the city collected by the Croton Board in the years 1866 and 1867:

Sources of Revenue.	1866.	1867.
Water rents and penalties....	$1,035,558	$1,176 728
Permits for taps in water pipes	6,869	8,365
Permits for sewer connections	29,775	47,895
Permits for vault constructions	39,617	45,725
Petty cash.....	1,382	1,015
Totals.....	$1,113,293	$1,279,629

The amount of work done in the paving of streets has been very large and has been very vigorously prosecuted. Thirty-two contracts have been made for the laying of some block pavement, covering an area of 215,850 square yards, in addition to which 29,000 square yards of Nicolson, or wooden, pavement have been laid at a cost of $4.75 per square yard. The streets included in this amount are Mercer, Broad, Nassau and Pearl, from Wall to Fulton.

There has been expended during the year for laying of pavements and crosswalks and building sewers, for which the city is reimbursed by assessments, $1,392,-677.—*Herald.*

A Novel Species of Champagne.—Is there any limit to the adulterations that a skilful and unprincipled chemist can now-a days practice? We have heard of turnip cider, beet root brandy, barley coffee, etc., but these and all similar impositions have been cast into the shade by the extraction of champagne from petroleum. The Portland *Star* assures us that among the thousand different substances of which champagne can be made, refined petroleum must henceforward be numbered. From the fiery benzoles, it tells that "a sparkling, foaming champagne can be produced, capable of delighting the eye, tickling the palate, and gladdening the heart." Truly, we live in an inventive age.

Correspondence.

Manhattan Gas Works, 18th Street Station,
NEW YORK, February 13th, 1868.

JAMES R. SMEDBERG, Esq., C. E.,

Office AMERICAN GAS-LIGHT JOURNAL:

Dear Sir: I have carefully considered your project of consolidating the London *Journal of Gas-Lighting* into a single volume which shall be more portable and of easier reference than the original series; and take pleasure in bearing testimony at once to the value of the task, and your own personal fitness for its execution. Thompson's "Chemistry of Gas-Lighting," some selections from the Croll Arbitration Case, and Kitts's essay on the handling of clay retorts, will of themselves secure very great value to your "Synopsis," and I must frankly say that I have long wished for the accomplishment of what you now contemplate. I hope that this note will enable me to head your list of subscribers, and that the other Engineers of the country will come forward promptly enough to secure us the work at an early day. Very sincerely,

JOS. A. SABBATON, Eng. &c.

Water Pipe Extension.

THE NEW THIRTY-INCH MAIN—ITS MANUFACTURE AT THE UNION FOUNDRY.

[From the Louisville Journal.]

It is an established fact that the water works of no city of the size of Louisville are complete or efficient without two main supply pipes. Up to the present time our city has had to depend upon a single main pipe, twenty inches in diameter, for its supply of water But our sagacious authorities sometime ago foresaw the inadequacy of this lone pipe to the increasing wants of the community, and authorized the issuance of bonds to the amount of $500,000, to enable the Water Company to perfect their supp y system by laying another main. The contract for making this thirty-inch pipe was awarded to Mr. Dennis Long, of the Union Foundry, on Ninth street, the builder of the great Water Works engines, which are regarded as the best ever constructed in this country.

The work of casting this mammoth pipe has been progressing for several weeks. Up to the 13th November 126 sections, each 12 feet in length, had been safely moulded, and most of them tested and finished. It is designed to lay this pipe from the engine rooms of the water works to the reservoir this present winter, and hereafter to continue it into the city and along Broadway, parallel to the old pipe on Main street. In forming this double connection between the engines and reservoir, the new pipe will be elevated above the reach of high water, rendering it accessible for repairs at any time of the year, and making it available in case of accident to the old pipe. This will obviate a recurrence of the distress our citizens have so often suffered on account of the old main pipe being submerged and disabled in the high-water season. The distance from the engine rooms to the reservoir is seven-eighths of a mile, which will require 325 sections of pipe. The aggregate weight of this pipe will be nearly 700 tons. Mr. Wm. Thompson, the superintendent of this class of work for the water company, is giving his personal attention to the testing and finishing of the pipe, and will direct its putting down this winter.

It speaks most highly of the enterprise of Mr. Long, as well as for the character of our metropolis, that this extraordinary job is being done in one of our own foundries, keeping at home a vast sum of money that would otherwise go to enrich other cities that have little or no interest in common with us. While St. Louis and other western cities are forced to patronize the iron works of Pennsylvania to the extent of millions of dollars, Louisville is fast gaining complete independence in that and all other branches of manufacture. Well may we feel proud.

THE UNION FOUNDRY.

This establishment deserves more than a passing no tice. It is the only complete and exclusive pipe foundry in the South, and orders are being filled for very many distant places. Mr. Long employs in all departments one hundred and twenty-five men. The expenses for labor are over $1,000 per week, or more than $80,000 annually. In the pipe foundry seventeen tons of pipe are cast daily, and in the moulding shop of the foundry four tons daily, or over one hundred and twenty tons per week. Gas and water pipe from two to thirty inch, and all the cast appurtenances for either gas or water works, such as T's, crosses, elbows, retorts, valves, etc., are made here in a style of workmanship not to be surpassed anywhere.

More Water for San Francisco.

THE SAN FRANCISCO WATER COMPANY—A GIGANTIC PROJECT—A PROSPECT OF PLENTY OF WATER AT LAST—PESCADERO CREEK TO BE PUT ON TAP—THIRTY MILLION GALLONS OF WATER A DAY.

[From the San Francisco Times.]

(Concluded from page 227.)

THE TUNNELS.

"The dimensions of the tunnels are estimated at 34 feet of cross-sectional area; and to be lined where required, to be cut true and to the proper grade.

"The estimated length of tunnels required will be 81,551 feet, or a trifle over fifteen and a quarter miles, a large portion of which will be through soft sandstone, and can be cut nearly as cheap as the work could be executed in any other manner; and, until we reach the valley of the Pilarcitos in no case is hard rock encountered on the line. Estimates have been made to include the lining where required, and for face walls at the entrance and exit of each tunnel.

"The whole cost of tunneling is estimated at $693,-022, and will, when finished, be the most substantial portion of the works.

THE PIPING.

Two estimates have been made for the conveying medium for the balance of the distance, one for a wood flume and one for an iron pipe. The wooden flume, four feet square in the clear, having an area of sixteen feet, and carrying with safety (with the descent, two feet in a mile), 25,000,000 gallons daily, is estimated at $1,209,379. The second estimate is for an iron pipe, circular in form, five feet in diameter, with an area of 19.62 feet. It is to be made of rolled iron and riveted together. Of this the engineer says:

"This will be a much more permanent mode of construction than a wood flume; will require no tending; will be in no danger from fire or falling timber; and, being buried, will not damage property in any manner whatever. There will be no waste from leakage or evaporation; and the water will be delivered cool, sweet, and clean at the terminus.

"The whole cost, with tunnels, etc., as included before, will be $1,446,444, or $247,647 more than the wood flume.

'With only this difference of cost in a work of as much magnitude as that about to be undertaken by you, we would earnestly recommend the use of iron in every case, and exclude wood and all other perishable materials whatever in its construction."

We understand that the recommendation of the engineer will be accepted, and that the water will be conveyed the whole distance from Cañada Raymundo in iron pipes.

FROM CANADA RAYMUNDO TO THE CITY.

The line of the aqueduct from Cañada Raymundo to the city has not yet been fully determined on. The lay of the ground is, however, well known, and no difficulties are likely to arise in this portion of the undertaking. It is settled, we believe, that the conveying medium here shall be either a brick aqueduct, or a series of iron pipes. No fluming will be used, as it is intended that the work shall be thorough and permanent.

THE AMOUNT OF WATER TO BE SUPPLIED.

The Pescadero Creek is the main source of the new water works, and in this connection the engineer observes:

"The streams discharging into the ocean between Half-Moon Bay and Point Año Nuevo are the only source from which San Francisco can be supplied at any reasonable cost; and we have no hesitation in giving it as our opinion that the whole will be required within the nex' fifty years.

"The amount of water which they will furnish has never been accurately ascertained, and, except on the Pescadero, no measurements have been taken. This stream, however, gives in the dryest time about 5,000,000 gallons daily, and for eight months in the year will fill the aqueduct—that is, 25,000,000 gallons; and by a judicious system of reservoirs along the line, we will be able to furnish for use 30,000,000 gallons daily."

PESCADERO CREEK.

Pescadero Creek is a beautiful stream of pure and limpid water, the excellent quality of which is attested by the fact that it abounds with fine trout—a fish that is peculiarly fastidious as to the kind of water in which he lives. It drains a water-shed of fully forty square miles above the point where the springs are tapped by the Spring Valley Water Company.

ELEVATION AND LEVELS.

The elevation of the reservoir at the dam on Pescadero Creek will be 400 feet above the level of the sea—about half that of the Spring Valley Water Company's works. The water can be brought into the city at an elevation of 250 feet above the level of the tide; and the quantity used below 150 feet will furnish the necessary power for raising all that will be required above the 250-foot level. It is proposed to use three levels, as against two by the other company, and a drop of 100 feet will be made near the city, which will give sixty feet head for an elevation of ninety feet.

DISTANCE, COST, ETC.

The entire distance, from Pescadero Creek to the center of the city, by the proposed line, is forty-five miles; from the Creek to Cañada Raymundo is twenty-five miles. The estimated cost of the entire undertaking, including the laying of distribution pipes throughout the city, is $4,000,000, or two-thirds of the amount of the capital stock. The time necessary for constructing the works is estimated at from eighteen months to two years, and it is calculated that by the expiration of the longer term, the supply will be distributed throughout the city. It is intended that all the mains laid down in the principal streets shall be three feet in diameter, and that no pipe connected with a hydrant shall be less than six inches in diameter.

CONCLUDING REMARKS.

Such are the principal features of an enterprise as gigantic in its relation to San Francisco as was the Croton Aqueduct to New York. An aqueduct capable of supplying a million of inhabitants. A source whence thirty millions of gallons of water daily may be drawn on emergency, and which will, in periods of the utmost drought, supply eight million gallons per diem with perfect ease. The importance to the city of such an undertaking is too manifest to require special comment, and as we understand the stock will be laid before the public in a few days, they will then have an opportunity of testing it for themselves. With such a supply of water as the San Francisco Water Works propose to furnish, and with such power as they will use, the city of San Francisco should be both a clean and a safe city in the years to come.

Absorption of Gases by Solids.

Among the interesting observations of Mr. Graham, Master of the British Mint, upon the passage of liquids and gases through solids, is the fact that atmospheric air, by passing through india-rubber, becomes superoxigenated, and will re-kindle smoldering wood like pure oxygen. Any kind of light india-rubber receiver, in which a vacuum may be obtained, the size being sustained by mechanical means, will collect superoxigenated air; the better if the india-rubber be thin and the temperature high. Mr. Graham makes the suggestion that the solid films pass gases through them by first condensing to a liquid form within the substance, and then passing them off on the other side by evaporation. Hydrogen gas passes through red-hot platinum, while oxygen and nitrogen do not, or not in appreciable qualities; hence their compounds with hydrogen are readily dialyzed by this method. The passage of carbonic acid, chlorine, hydrochloric acid, vapor of water, ammonia, coal gas, and hydrosulphuric acid, is also inappreciable, while the hydrogen, in compounds containing it, passes. One volume of red hot platinum absorbed 0·207 volume of hydrogen, retained in while cold, and gave it off on reheating. One volume of palladium absorbed 643 volumes of hydrogen, sensibly increasing its weight, and when heated afterward, gave off the most of it in a continuous stream. On the other hand, osmium-iridium does not absorb hydrogen, and copper absorbs it very slightly. Gold absorbs hydrogen and nitrogen slightly. Silver absorbs 0·289 of its volume of hydrogen, and then presents a beautifully frosted appearance. Oxygen is taken up in the proportion of 0·745. Red-hot iron and steel pass hydrogen as readily as platinum does.—*Sc. American.*

THE FOLLOWING excessively instructive "Essay" on Coal was delivered in 1858, by an Oxford candidate to the examiners at Cheltenham:

"Coal is a black mineral. The way they produce it is this: First they dig a large pit in the earth. Then they cut down a quantity of timber and put it in the pit, and cover the whole with peat. Then they burn the timber. After it has been burnt once it becomes charcoal, and out of the charcoal they make *oxygen* gas, with which we light our streets and houses."

The Hugon Gas Engine.

One of the most important mechanical exhibits in the Agricultural Society Show this year, is the Hugon gas engine, which is exactly what its name implies—an engine the motive-power of which is obtained solely from common gas, either that supplied by the gas companies, or gas manufactured from any substances, and in any manner. This engine is the invention of M. Pierre Hugon, and though discovered and patented by him in 1852, has only recently been offered to the public. The first engine invented by M. Hugon needed electricity, and required so considerable a quantity of grease as to cause the cylinder either by its own expansion to stop the engine, or to create such an amount of residuum as to clog and impede its working. This convinced M. Hugon that the complicated and delicate arrangements of electric batteries, etc., would be an insuperable objection in a workshop, and that the engine he then patented would not fulfill the object he had in view, namely, to supply to industrial occupations of every class an economical and ever ready motive-power available where steam would be objectionable or unattainable.

In the engine, as now perfected, by an arrangement the excellence of which consists in its utter simplicity, the gas, so soon as turned on, enters the cylinder mixed in its passage with about nine times its bulk of common air. The gas having been turned on, all that is necessary to start the engine is to light two ordinary jets of gas, which in their turn light two others; these last inflame the explosive mixture of gas and air conveyed to the cylinder, and being extinguished by the explosion, are relit by the two jets fixed outside the cylinder. At the moment of explosion a very fine spray of water falls on the piston, and (the heat being then 1,200°) becomes steam, thus reducing the heat and equalizing the pressure throughout the stroke, so that the engine lubricates itself by its own action. It is impossible to enumerate the advantages this engine offers. From perfect repose to full activity not two minutes elapse. It is as easily and as readily set to work as a jet of gas is lit, and is as instantly stopped, and all day and all night, or at any number of arbitrary intervals, just as its force is required, is this engine at the service of its owner.

The simplicity of this engine, combined as it is with economy, cleanliness of working, and, above all, safety, entitles it to rank the foremost of its class. Its steadiness in working is remarkable; with one hand on the piston-rod while in full work we could detect no symptom of shock from explosion, or any unsteadiness whatever. The Hugon gas engine needs nothing whatever but the turning on of the gas to set it in full work, and requires no overlooking during the time it is employed. It continues working without stopping during all the time it is needed, and there is no danger of the remotest kind to be apprehended from its use. No combustible is used, consequently no supply of fuel is required to be kept, and no smoke issues from the engine, which neither requires skill to start it nor any attention whatever during its working. It is a remarkable circumstance that this gas engine is the only machine allowed to be put in motion in the whole show; this is at once high testimony to its safe and otherwise unobjectionable character.

The Hugon gas engine attracted considerable attention at the late Paris Exhibition, where several of them were at work. One of these engines of 3-horse power, worked night and day during the Paris Exhibition in the Manutention Civil et Militaire. In the annexe of general mechanics, a 1-horse engine supplied the power to the laboratory of chemistry, class 51; and a ½-horse engine printed all the tracts for the Foreign Mission of the Protestant Library. The Faculty of Science, the Sorbonne, has selected for purchase a 2-horse Hugon gas engine from all the motors at the Exhibition. Many of these engines have been sold all over England, and are doing their work most satisfactorily.—*Mechanics' Magazine.*

Late Mining News.

[Compiled from our Exchanges of January 11.]

Alpine Co., Cal.—Work is carried on steadily upon the I. X. L. lode, and although the No. 1 ore, for which the company gets $100 per ton at the dump, is not found in sufficient quantities to furnish a small mill, yet they get some all the time; and of the second quality ore they find satisfactory quantities.

The workmen in the Tarshish mine, on the 20th December, brought in a lot of ore better than ever before found in the mine.

Amador Co., Cal.—Mr. John Agrell, superintendent of the chlorination works of Messrs. Coney & Bigelow, has finished the working of a lot of sulphurets taken from the Keystone mine, and the yield far exceeds the most sanguine expectations of the owners of that mine. The quantity of sulphurets worked was 16 tons, which produced 231 ounces of gold—fineness, 971; value, $4,639; average per ton, $289.94.

Calaveras Co., Cal.—Late reports from Washington have thrown the mining community into a terrible state of excitement. We learn that the discoveries in that district were astonishing every one who had any knowledge of quartz mining in the vicinity, and that the extent of the rich quartz ledge region was marvellous. The Washington claim had just realized from 13 tons of rock, crushed from their quartz lode, the sum of $900.

A. T. Smith & Co. have a lead of the most wonderful richness—experienced and reliable miners declaring that the rock taken from their vein will average not less than $500 per ton. Other claims in the same vicinity are reported very rich. An immense number of claims have been recently located, and in spite of "wind and weather," the lucky locators are prospecting with a cheerful and hopeful industry, truly Californian.

Nevada Co., Cal.—The North Star Co., at Grass Valley, have declared a dividend of $10,000 to the shareholders.

The rock taken out of the Scandinavian mine is literally specked with fine gold, besides containing rich sulphurets. The ledge is now about three feet thick, and the new tunnel opens up an immense lot of ground.

Alaska.—Reports daily reach New Archangel of a gold discovery on the mainland, and the men employed in the Quartermaster's Department have given notice of an intention to quit the service in the spring and go to gold hunting.

Colorado.—The material in the drift on the Illinois lode grows better, paying now $13 or $14 per ton.

The yellow quartz of the Malabar lode, Peru district, produced $68 per ton, and 70 per cent. of lead, two different runs at the Georgetown Smelting Works. The Silver Eagle produced at the rate of $219.04 per ton. The Hartwell lode on same creek produced at the rate of $240 per ton.

Idaho.—All accounts from the upper country report flush times at Silver City and Ruby City. It is said the prospects have never been better since the opening of the mines. Large quantities of bullion are being taken out, some mines yielding fabulously.

Montana.—Tenderfoot Gulch is played out, and the miners have all left there. Several drain ditches were dug, in order to test the ground, but the prospects obtained were not sufficient to justify the building of winter quarters.

New Mexico.—There is a great rush just now to the new diggings at Cimmaron, New Mexico.

PATENT CLAIMS.

Pertaining to Gas, Mining, Petroleum, Water, etc.

74,001.—Process of Generating Gases and in the Application of the Same—John T. Rich, Philadelphia, Pa. Antedated Jan. 23, 1868.

I claim, 1. The process of generating and procuring the partial decomposition of atmospheric air by the action of wet steam in contact with metallic or other hard substances, for the purposes set forth.

2. The process, substantially as described, of saturating atmospheric air, and the subsequent application of the same to the purposes of chemical distillation, or mixed with carbon or hydrocarbon vapors to heating or illuminating purposes.

3. The process of generating and preserving oxygen gas by the action upon a current of atmospheric air or electricity, evolved by a jet of wet steam, and the consequent separation of the steam and nitric acid from the oxygen thus set free, substantially as set forth.

4. The mode of manufacturing, illuminating, and heating gases by mingling hydrocarbon gases or vapor with oxygen gas, generated, substantially in the manner set forth.

5. The mode of manufacturing mingled oxygen gases for use in the desulphurization of ores, etc., substantially as set forth.

74,063.—Manufacture of Illuminating Gas.—John J. Ensley, New York City, assignor to Thomas T. Ledyard, Toronto, Canada. Antedated Jan. 27, 1868.

I claim making a compound gas by the mixture of common coal gas, of gas made from bones, or other animal matter, and from wood, or equivalent vegetable matter, either separately or combined, for the purposes herein specified.

74,099.—Gas Torch.—Wm. A. Lawton, N. Y. City.

I claim, 1. A gas torch for all the purposes for which gas torches are used composed of the tube, A, and supply tube, D, and air tube, E, and an enlarged wick tube, F, substantially as shown and described and for the purposes set forth.

2. The air tube, E, in combination with the tube, A, and the tube, D, substantially as shown and described and for the purposes set forth.

74,132.—Gas Machine.—Iva Prichard, Terre Haute, Indiana, assignor to himself and Joseph Raiber, Baltimore, Md.

I claim, 1. The combination of the air chamber, a', and water chamber, a, with the carburetting vessel, B, and the receiving vessel, C, in the manner and for the purpose set forth.

2. The application of a column of water to a carburetting machine, for the purpose of condensing air and forcing it through the carburetting fluid, substantially as shown and described.

74,188.—Mode of Compounding Printers' Ink from Grahamite.—Henry Wurtz, New York city.

I claim the use, as an ingredient in printing inks, of the resinous constituent of the Grahamite of West Virginia, called by me viscosine.

The Cameron Coal Co.,

MINES LOCATED AT

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The Company are prepared to fill orders at the lowest possible prices for their Coal, which BY ACTUAL TESTS PROVES TO BE EQUAL TO ANY OTHER BITUMINOUS COAL MINED FOR GAS PURPOSES, and is equal to any in use for Locomotives and steam purposes generally.

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188 JOS. P. MANTON, Agent.

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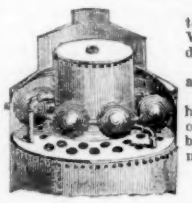

Requires only 25 lbs. of coal per day to the horse-power. Are made of the VERY BEST IRON, double lapped and double riveted.

Being upright, occupy little space, and are easily cleaned.

Without additional fuel, the Superheater increases the working capacity of the steam 25 per cent., which has been fully demonstrated by the many now in use. (See illustrated circulars).

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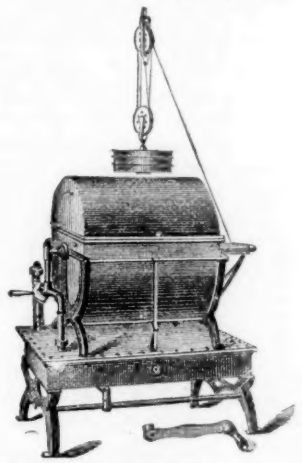
SOLAR GAS MACHNES.
For lighting Private Dwellings, Churches, Hotels, and Factories in any locality and independent of any Gas Company.



We manufacture eight sizes of the SOLAR GAS MACHINE, ranging from ten to five-hundred light capacity. Every machine is put in operation and fully tested before it is sent off, and is guaranteed to give perfect satisfaction. This new apparatus is the result of 15 years of experience in this special line of manufacture, and we feel warranted in asserting that our machine excels all others of a similar kind in the market. It is much simpler and more efficient than any former manufacture, and is constructed with special reference to safety and durability. There is no possibility of an explosion under any circumstances whatever, nor is the gas tank likely to leak or give out, or any part of the machine to get out of order, if reasonable care is taken of it. From five to fifteen minutes' attention is all that is required to keep any size of machine in perfect working order to supply all the burner-jets in a dwelling or factory.

Testimonials.

SOUTHBORO', March 20, 1867.

MESSRS. O. P. DRAKE & CO., BOSTON:

Gentlemen: In answer to your inquiry, I will say that I had your Gas Machine in use about nine months, manufacturing gas for lighting my store. It gives me but very little trouble. The light is good, clear, and at all times reliable. Its cost is less than half the cost of street gas. As regards safety, I think it very much safer than Kerosene lights.

Yours respectfully,
WM. C. BARNES.

BOSTON, Aug. 22, 1867.

MESSRS. O. P. DRAKE & CO., 8 Bedford-st., Boston:

Gentlemen: I purchased of you, Nov. 18, 1865, one of your Solar Gas Machines, for my house at Auburndale; and from that time until the present, I have enjoyed uninterrupted success with it. The light is uniform, clear and steady, and the best I have ever seen. I have never experienced trouble of any nature from the machine, and consider it invaluable. As to its safety as compared with any other illuminator, I consider it far superior, and have discarded everything else in the shape of oil, fluid, kerosene, etc. Hoping your invention may prove remunerative, I remain,

Yours respectfully
W. E. PLUMMER,
53 Merchants' Exchange.

LAKE FOREST, ILL., Aug. 30, 1867.

CHAS. MATTHEWS, Esq., Agt of Drake's Solar Gas Mach., Chicago:

Dear Sir: Your letter was received, asking how I liked the working of the Solar Gas Machine put up by you for me. I would say that I have had the machine in constant use for the last 6 months, and am well pleased with it. The light is clear and steady, and the whole apparatus works to my entire satisfaction.

Yours,
WM. S. JOHNSTON, JR.

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We keep on hand range in size from No. 1 to No. 4, and occupy a space for No. 1, 2 x 3 feet, 2½ feet high up to 2½ x 5 feet, 4½ feet high for No. 4, weight of machines from 350 to 1,000 lbs. The No. 1 will supply 5 Argand or 10 bat's-wing burners 6 hours, and No. 4 will supply 50 Argand or 100 bat's-wing burners 6 hours.

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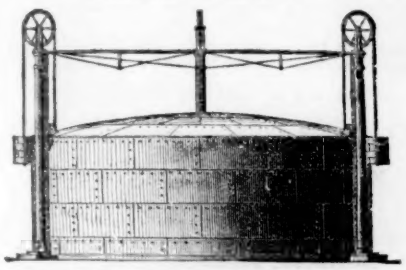

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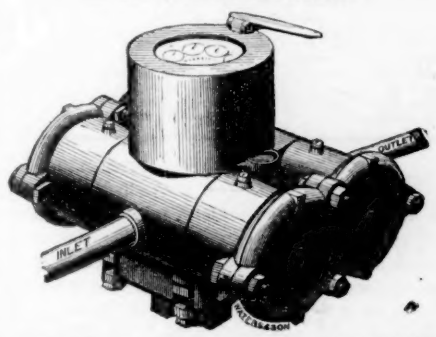

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This Meter is also used for the measurement of Oil —it combines
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SCIENTIFIC GAS HEATING APPLIANCES,
For every known trade or profession.
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Gas Stoves made by us are constructed under the immediate supervision of A. L. BOGART, Esq., Analytical Chemist and Gas Engineer. They contain recent improvements of a scientific character—by means of which a PERFECT COMBUSTION is obtained, and the Caloric produced, rendered CHEMICALLY PURE. Too much cannot be said against the use of Gas Stoves for heating apartments—when the products of combustion (Carbonic and Sulphurous Acids are emitted without purification into the atmosphere. Your Physicians will inform you, that this is a subject of vital importance, and worthy of your closest scrutiny—before purchasing. The public are invited to examine into the merits of these inventions.

Every article WARRANTED as represented.

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AMERICAN GAS-LIGHT JOURNAL,
Published on the 2d and 16th of Each Month
At No. 22 Pine Street, New York.
M. L. CALLENDER & CO.,
EDITORS AND PROPRIETORS.

MONDAY, FEBRUARY 17, 1868.

WISHING TO MAKE this Journal an organ of intelligent discussion to those of our readers who may wish to gain or give information on the subjects to which its columns are devoted, the publishers solicit letters from all among them who make the study of those subjects a pleasure, or a profession.

SUBSCRIBERS would confer a favor upon us by remitting CHECKS or POST OFFICE MONEY ORDERS, as we are frequent losers where money is enclosed in letters.

☞ NEWS AGENCY.—The American News Company, 119 and 121 Nassau street, New York, are agents for this Journal. Newsdealers will please send orders to them.

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Answers To Correspondents.

L. A., of Texas.—Perchloride of iron in solution employed topically is very efficacious to destroy the virus, after the bite of a rabid animal—is an antidote for various animal poisons. An alloy of one-third silver, 25 to 39 per cent. of nickel, and from 37 to 42 per cent. of copper forms a beautiful alloy, which resembles platinum and silver in color. It takes a brilliant polish. It is ductile, malleable, and very difficult of fusion; very sonorous, malleable, in the air, and attacked only by the most energetic reagents. Its specific gravity is a little less than silver.

G. A. P. of Boston.—Cryolite is the mineral from which aluminium is obtained in largest quantities. It is obtained in large quantities from Greenland. Aluminium is increasing in favor rapidly, as a most beautiful metal capable of superseding silver for many purposes. Bryalite is used in certain metalurgical operations with great profit. The application is kept a secret.

N. B., of S. C.—The Haskins gas stoves, heaters, etc., are all they are represented. They are clean, healthful, inodorous, and economical. Prices for stoves are $12, $15, $18, according to size. Agents, C. S. Simpson, 22 Pine street, and Ford & Murray, 29 East Thirteenth street, New York, of whom rights for States and manufacturers can be obtained.

T. P., of D. C.—It takes about 4,000 cubic feet of hydrogen gas to inflate a balloon that will sustain an ordinary sized man in the air. Atmospheric air is the unit from which the gravity of other gases is reckoned. Hence, hydrogen is placed at .0691, air being 1.

C. L., of Ill.—Send on your model and first instalment of patent fee, $15, and we will proceed to complete your case at once. The preliminary examination of the other case is favorable to you.

D. A. L., of N. Y.—Artificial ivory may be made by dissolving 12 oz. amber, 3 oz. Kourie gum, and dissolve them in wood-spirits, or alcohol; then add 7 oz. of fine china-clay, and mix together thoroughly by stirring, aided by a gentle heat. The composition is then to be placed in dies, and made into the required form.

GENERAL TOPICS.

Upon another page we publish at length, a truly French article upon the magnesia light of Messrs. Tessier du Mothay and Marechal. We learn through private letters that the shares of the Paris Gas Co. declined 140 francs on the morning after the display in front of the Hotel de Ville, and can fancy to what profane outbursts of admiration, and over doses of absinthe, the combustible Parisians were incited by this "charmingest of miracles." We look at the thing more soberly, and recognize in it the very features which made its prototype useless for general purposes.

What we mean is this:—given a million compound blow-pipes, duly arranged with the ramifying systems of separate pipes for oxygen and for hydrogen—given oxygen cheaply derived from the revivifiable manganate of soda—given your spherules or your cylinders of magnesia—what have you got, ye unpronounceable gentlemen?

Simply a huge philosophical toy, liable to constant derangement; whose practical value no "million-magnifying microscope" of finance, nor any martyred President of the "*Credit Foncier of America*," (whatever that may mean) can by possibility make visible to editorial orb. You would render a chemist as necessary as a cook in every household, unless indeed the offices were united through some bifurcate University whose prongs are a Blot and a Faraday. And how would you like to catch the presiding genius of your kitchen alternating between fried onions and oxyhydrogen? For ourselves we couldn't stand it.

We understand that mysterious men do now hover about the Patent Office; and ere long the coal-gas companies will have this Drummond Redivivus thundering at their gates. But the thunder will roar innocently, and the storm will pass by, as a thousand other patent storms have passed, for even the Sphinx who adorns France by his magistracy cannot beguile us into sympathy with his imperial nod.

Many of our readers have complete sets of the London *Journal of Gas-Lighting*, and are aware how difficult and tedious it is to refer to any articles of value to us. Very valuable articles it certainly contains, but buried under a load of local squabbles and fatuous investigations, and the heaviest sort of Parliamentary stupidities. These fill the sixteen volumes of the London Journal which have been issued up to the 31st of December last. Now we are requested by Mr. Smedberg to state that he proposes to cull out the valuable and interesting portions of these bulky volumes, and publish them in a single closely-printed quarto of 700 or 800 pages. The cost of the work will be fifteen dollars a copy, and it will be delivered only to subscribers. The excerpts will be alphabetically arranged and carefully indexed, and the whole will, from its compactness, be far more useful to the engineer than the original series, which costs somewhere in the neighborhood of $175 to import. So soon as Mr. Smedberg is in receipt of sufficient names to warrant him in the work, it will be begun and pushed steadily forward to completion. No collections will be made until the book is delivered.

Subscribers are requested to forward their names as promptly as possible to the office of this Journal.

As we write we have spread out before us specimens of a new application of wood to decorative purposes. All that was beautiful in the cumbrous wainscoting of mediæval England is preserved, without losing the ease of adaptation and economy of wall-paper. It cannot be long before this invention will have replaced the brilliant vagaries of the designer which now cover our walls, by the chaster hues of Nature herself; and we are most cordially glad that companies are being rapidly organized to work under Mr. Davis's valuable patent.

To cut our story short, let us mention that a log of wood is shaved at a single operation into one sheet of about 1-100th inch in thickness. This is the fabric offered by the "New York Wood Hangings Company" as a substitute for wall-paper, and a most pleasing and satisfactory substitute it is. A log, *steamed*, of ten feet in length, is made to revolve in a sort of lathe against a stationary knife of the same length, being fed horizontally up to it by a very slow motion. In this way the whole log is reduced to one huge shaving of uniform thickness, the operation necessarily stopping when the core becomes too weak to withstand the power applied. Being so very thin, the fabric is very readily dried, and is then ready for use, except in the case of some of the harder woods, which are found to demand final treatment in a bath of glycerine. After being pasted upon the wall a simple coat of oil is applied, and the thing is done.

This notice is entirely unsolicited, and is given only from our desire to record every invention which, like this, involves advantages of substantial and general interest. The company's office, No. 179 Broadway, is very handsomely panelled with the different classes of veneering, and is constantly full of appreciating visitors.

We have received several inquiries in reference to the report of the arbitration between A. A. Croll and the Great Central Co, and take this medium of advising our correspondents that a few copies have been ordered by D. Van Nostrand, whose advertisements appear regularly in our columns. He will probably receive the work in the course of a fortnight.

A copy of the "Gas Engineers and Superintendents' Pocket Almanac," issued by the American Meter Co., has been laid upon our table. In addition to illustrated advertisements of the very valuable and accurate varieties of apparatus manufactured by the company, it embodies many formulæ and tables of practical value to gas-makers.

The press upon the columns of our present issue compels us to postpone for a fortnight the publication of Dr. J. Lawrence Smith's interesting report upon the gas processes of Europe, for the receipt of which we are indebted to the courtesy of its author. Dr. Smith, it will be recollected, was one of the Commissioners from the United States to the Paris Exhibition.

The "National Freemason," edited by R. McMurdy, D.D., L.L.D., and published at 432 Broome street, furnishes a weekly compendium of all matters of interest to the masonic order throughout the country, and its columns are characterized by very marked editorial ability and judgment.

We have had our attention drawn to the first "General Announcement" of the CORNELL UNIVERSITY, recently opened at Ithaca, N. Y., and are much struck with the judicious scheme upon which its collegiate course is adjusted. Its Board of Trustees comprise many of the most prominent men in the State, and argue the selection of a faculty fully competent to discharge their important duties.

The New York *Evening Express* has noticed our Journal in flattering terms, for which editorial courtesy we desire to make our acknowledgment to its able managers.

We would call the attention of our readers to the advertisement of new patent pianos, by Messrs. Raven & Bacon, New York, whose improvement is thus referred to by the New York *Tribune*. Musical criticisms by this journal are considered very valuable, and are charily given:

"Another improvement in pianos is claimed by the house of Raven & Bacon, 644 and 646 Broadway. They have introduced a vibratory chamber or drum, composed of a series of sounding boards, in that part of the piano-case not occupied by the keys. Upon this vibratory chest is supported the main sounding board which carries the strings, thus separating and relieving it from the solid work of the case, and resting it entirely on the vibratory chest. The effect of this is to increase remarkably the power and quality of tone, and we emphasis the fact that it embodies a successful endeavor to improve the sounding-board, the attempt to do which has so often failed.

"The connection in the ordinary piano of the sounding-board with the solid work of the case has the effect of a damper upon the board, thereby dulling or preventing its vibration and necessarily shortening the tone of the instrument. The great aim of the manufacture is to obtain a powerful and prolonged tone, as in the organ or violin. The over-strung bass accomplished one of these points, but the connection of the sounding board with the case prevented sustainment and length of tone. In the Messrs. Raven & Bacon's improvement, the sounding-board, resting as it does, separate from the case, on another sounding-board, is freed from the rigidity of such a connection. The increased vibration thereby imparted, produces a full, mellow and prolonged singing-tone. An examination of the instrument will satisfy th so who seek, that in power of tone and singing capability it has qualities that fit it for the exacting service of the best music. The house of Raven & Bacon dates from the year 1829, and in that time their instruments have won a reputation for capacity and durability that is in itself a prepossession in favor of any improvement they announce."

NEW PATENT PIANOS.

RAVEN & BACON.

(Established 1829.)

Warerooms Nos. 644 & 646 Broadway, N. Y.

Manufacturers of Piano Fortes, with their Patent Combination Sounding-boards,

Patented Aug. 14, 1866.

This invention, introduced exclusively into our Pianos, is of the greatest advantage to the tone of the Instrument, as it affects the sounding-board, the very soul of the Piano, and produces thereby a pure liquid tone greatly superior in quality and power to that of the ordinary Piano. The sounding-board released from its connection with the Piano case, and resting upon under sounding-boards, is relieved from the rigidity caused by such connection, and its vibratory quality increased.

Our Pianos are first class in every respect, and purchasers will have not only our own guarantee as to their quality, but also the guarantee of the reputation of the instrument, obtained from the experience of our patrons who have used them for a generation. All lovers of this eminently household instrument, as well as parties proposing to purchase new Pianos, are invited to call and examine our assortment. [196-1yr.

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CINCINNATI, OHIO.

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Dr. Marcy, Cape Island Gas Co., N. J.
W. F. Warner, Owego Gas Co., N. Y.
E. Wilcox, Joliet Gas Co., Ill.
Messrs. Woodbury, Walter & Potter, Kalamooza Gas Co., Michigan.
H. H. Fish, Utica Gas Co., N. Y.
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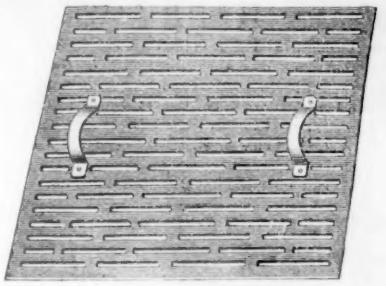

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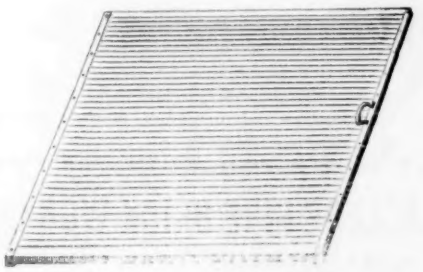

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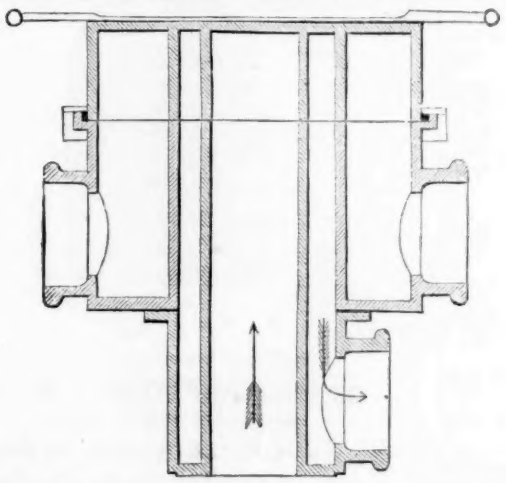

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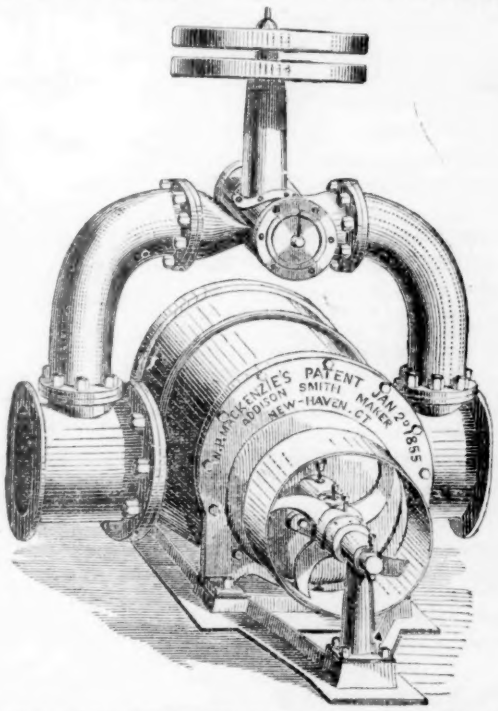

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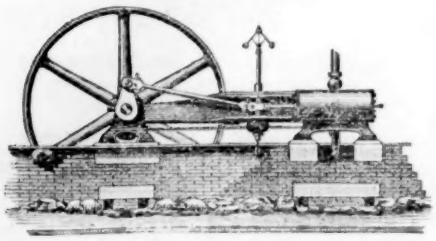

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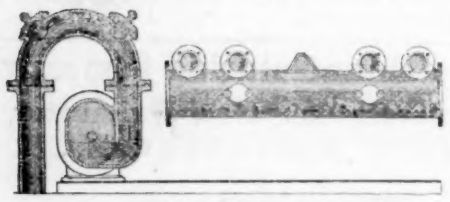

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184) Foot of West Twenty-seventh st., New York.

FOR SALE.

CASTINGS, STATION METER, ETC.—THE Wilmington (Del.) Gas Company having enlarged their works, have the following articles for sale:

Three sections of hydraulic main 15 inches diameter, suitable for three benches of three retorts each, with stand &c., and Dip Pipes of 3 inch diameter.

Four Purifying Boxes 4 by 6 feet, centre seal, and boxes for Condensers to rest on. One large Scrubber 4 feet diameter, 16 feet high. Three 6 inch valves and all the pipes, bends, etc., necessary for the Purifying House and Cellar. Three castings, used for washers, 16 inches diameter, 12 feet high. One Station Meter 4 feet diameter. One Governor and all the valves, pipes and bends necessary to make the connections in Meter House and Cellar.

The above are in good condition and can be seen at the Works Will be sold low if applied for soon. G. RICHARDSON, Pres. (84-4t

GAS STOVES AND HEATERS.

HEATER NO. 3.

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METROPOLITAN

Odorless Gas Heating and Cooking STOVES AND RANGES.

A. L. Bogart's Patent, Nov. 26, 1867.

The only inodorous Gas Heaters made in the world.

Salesroom, 702 Broadway, fourth door above Fourth st., N. Y.

NATIONAL FOUNDRY AND PIPE WORKS.

Office and Works—Carroll, Pike, Smallman and Wilkins Streets,

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WM. SMITH,

Manufacturer of all kinds of GAS and WATER PIPE, BRANCHES, CONNECTIONS, T's, ELBOWS, and ALL CASTINGS USED AT GAS AND WATER WORKS.

I offer special inducements to parties wishing to purchase, my Pipe is Smooth, regular in weights, and cast vertically.

N. B.—Pipe from 3-inch and upwards cast in 12-ft. lengths.

☞ SEND FOR CIRCULAR AND PRICE LIST.

149

BENNETT, JOHNSON & CO.,

42 DEY STREET N Y.,

Manufacturers of the

NEW PATENT BAG-HOLDER AND SHINGLE BRACKET.

This BAG-HOLDER is emphatically the FARMERS and GRAIN DEALERS FRIEND. Does the work of two boys in holding a bag open, and with it a farmer can bag up grain, potatoes apples, etc., as fast as two men in the ordinary way. It has large sales at the West, where first introduced. Retail price $5. Sent to any address.

THE SHINGLE BRACKET

Is especially adapted for Builders, house Joiners, Masons, and Carpenters. With it a scaffolding can be built in less time upon a roof and with greater safety, and taken down as quickly, without leaving a single nail hole in the roof. Retail price $6 per dozen. Send for illustrated circulars as above. Orders promptly filled, at wholesale and retail.

Manufacturers of the

NEW STEAM COOKING APPARATUS,

which cooks all vegetables and meats together, without flavoring each other, and does away with all offensive odors. SAVES LABOR, FUEL AND TIME.

SEEING IS BELIEVING.

One trial will convince any one. Large numbers now in use and everybody pleased; sold low; several sizes—fit any stove—a whole dinner can be cooked on one stove-hole. Orders promptly filled, at wholesale and retail. Send for an illustrated circular, with full particulars. Retail price: 7 in. $4; 8 in. $5; 9 in. $7; 10 in. $10. Sent to any address on receipt of price.

H. BROWN'S PATENT

Metal Top Lamp Chimney,

First Quality Extra Annealed Glass.

Will not crack or break from sudden changes of temperature, is readily cleaned, and with ordinary care should last just as long as the lamp on which it is used. Liberal discount allowed to the trade. Samples sent on receipt of fifty cents.

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189 45 Fulton-street, New York.

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Successors to Alfred Bliss & Co.

MANUFACTURER AND JOBBERS OF

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LAMPS

CHANDELIERS,

BRACKET,

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Lamp Trimmings

GENERALLY.

Station, Sugar House, Street and Coal Oil Lanterns.

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Illustrated catalogues and price lists furnished on application.

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JOINT STOCK COMP NY.

OFFICE 157 [Room 19] BROADWAY,

New York.

W. C. POTTER, Vice Pres't.
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PLASTIC SLATE

FOR

ROOFING & OTHER PURPOSES.

The process of reconstructing Slate Stone from a disintegrated state was

PATENTED FEBRUARY 21st, 1865.

It is a combination of

Pulverized late & Viscous Matter,

(the latter possessing qualities of geological and chemical affinity for the former,) and is a development of one of the simple but unalterable tendencies of nature.

As a Roofing Material it Stands Unrivalled.

A mastic—it adapts itself to every shape and slope. Non-combustible, impervious, non-expansive, and undecaying.

Frost does not Crack nor Heat Dissolve it.

The only roofing material ever discovered that will resist the action of the elements as long as the structure it protects. Being susceptible of little, if any wear, from exposure, and

Perfectly Fire-Proof,

It is unequalled as a coating for Railroad and Farm Buildings Fences, Bridges, bottoms of Vessels, Vaults, etc.

GAYLORD'S PATENT COUPLINGS,

Fig 3

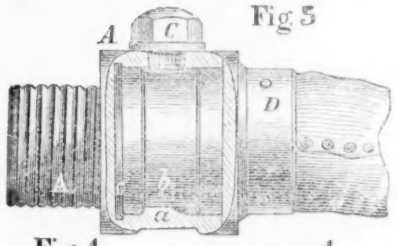


Fig 4

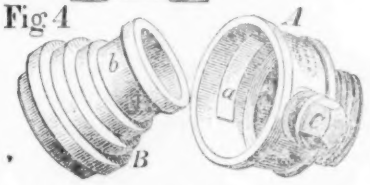
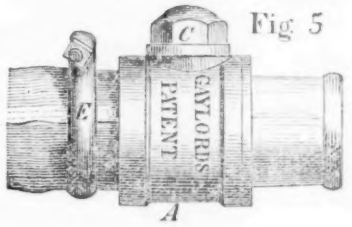


Fig 5



FOR

Hose, Engines, Hydrants, Ships, Steamboats, Steam, Force and Garden Pumps, Faucets for Public and Private Buildings, Gas and Water Pipes, Hose Pipes and Hose of all description, etc.

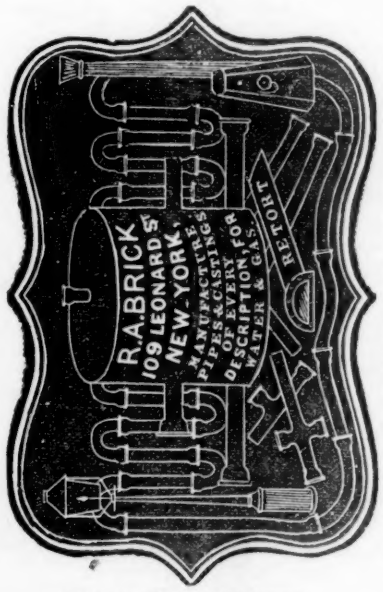
MANUFACTURED ONLY BY

GAYLORD'S PATENT COUPLING CO.,

185 31 and 33 Dey street, New York.

DRIVING PIPE,

BERGEN IRON WORKS,



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AND BANDS COMPLETE.

BROOKLYN TUBE WORKS.

B. T. BENTON,

MANUFACTURER OF

WROUGHT IRON AND GALVANIZED

TUBES,

For Steam, Water, or Gas.

MANUFACTORY AND OFFICE,

Corner John and Adams Street, Brooklyn

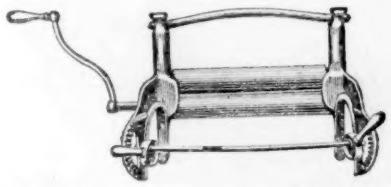
ALSO

58 John Street New York. 171

PUTNAM'S CLOTHES WRINGER.

IT IS THE ONLY RELIABLE

Self-Adjusting Wringer.



No Wood-work to Swell or Split. No Thumbscrews to get out of order. Warranted with or without Cog wheels.

It took the First Premium at Fifty-seven State and County Fairs in 1863, and nearly double that number in 1864, and is, without an exception, the *best* Wringer ever made. Patented in the United States, England, Canada, and Australia. Agents wanted in every town, and in all parts of the world. Energetic agents can make from $8 to $10 per day

WHAT EVERYBODY KNOWS, VIZ.:

That Iron well galvanized *will not rust.*
That a *simple* machine is better than a complicated one.
That a Wringer should be *self-adjusting, durable, and efficient.*
That thumb-screws and fastenings cause *delay* and *trouble* to regulate and keep in order.
That wood soaked in water will *swell, shrink,* and *split.*
That wood-bearings for the shaft to run in *will wear out.*
That the Putnam Wringer, with or without cog wheels, will *not tear the clothes.*
That cog-wheel regulators are not essential.
That the Putnam Wringer has *all* the advantages, and *not one* of the disadvantages above named.
That all who have tried it pronounce it the *best* Wringer ever made.
That it will wring a thread or a bed-quilt *without alteration.*

We might fill the paper with testimonials, but insert only a few to convince the skeptical, if such there be; and we say to all, *test* Putnam's Wringer. Test it *thoroughly* with *any* and any others, and if not entirely satisfactory, return it;

PUTNAM MANUFACTURING CO.—*Gentlemen:* I know from practical experience that iron well galvanized with zinc will not oxydize or rust one particle. The Putnam Wringer is as near perfect as possible, and I can cheerfully recommend it to be the best in use. Respectfully yours,

JOHN W. WHEELER, Cleveland, O.

Many years' experience in the galvanizing business enables me to indorse the above statement in *all particulars.*

JOHN C. LEFFERTS, No. 100 Beekman St.

NEW YORK, *January*, 1864.—We have tested Putnam's Clothes Wringer by practical working, and know that it will do. It is cheap; it is simple; it requires no room, whether at work or at rest; a child can operate it; it does its duty thoroughly; it saves time, and it saves wear and tear. We earnestly advise all who have *much* washing to do, with all intelligent persons who have *any*, to buy this Wringer. It will pay for itself in a year at most.

HORACE GREELEY.

PRICES—$8, $9, and $10.
Sample Wringers sent, express paid, on receipt of price.
Manufactured and sold, wholesale and retail, by
PUTNAM MANUF'G CO.,
13 PLATT STREET, New York,
BENNINGTON, Vt.,
CLEVELAND O.

WEED'S

HIGHEST PREMIUM

Shuttle Sewing Machine.

Has only to be seen and operated to be appreciated.

Call and see for yourself before purchasing. Please bring samples of various kinds of thread (such as is usually found at stores), and various kinds of fabric, which you know the former most popular sewing machines either cannot work at all, or at best very imperfectly.

SUPERIORITY

over any other machine in the market will be seen at a glance:

1st. It runs easily and rapidly, and is so constructed as to endure all kinds of hard usage.
2d. No breaking of threads in going over seams.
3d. No imperfect action of the feed at uneven places in the work.
4th. The Weed-stitch catches of itself, and will sew from the finest lace to the heaviest leather, and 200 cotton to coarse linen thread.
5th. The Weed Machine will do beautiful quilting on the bare wadding, without using inner lining, thus leaving it soft as if done by hand.
6th. The variety of fancy work that can be done on the

WEED MACHINE,

with so little trouble, make it equal, if not superior, to six machines combined; for instance, it binds, tucks and sews on the band at the same time, and in fact, the

WEED NO. 2 MACHINE,

as before stated, is equivalent to a combination of any six ordinary machines.

Orders for machines may be sent through the American Advertising Agency, 389 Broadway, New York.

Below we give a few prices.

No. 2. Oil Black Walnut, Ornamented with Hemmer.	$60,00
No. 2. Oil Black Walnut, Hall Case, Ornamented, with Hemmer.	65,00
No. 3. Extra Oil-Polished Black Walnut, Half Case, Large Table beautifully Ornamented.	75,00

WEED SEWING MACHINE Co.,

136. 506 Broadway, New York

THE AMERICAN METER CO.

Organized under the General Manufacturing Laws of the State of New York

SAMUEL DOWN, President. HENRY CARTWRIGHT, Vice President. RICHARD MERRIFIELD, Secretary and Treasurer

Trustees.

SAMUEL DOWN, WILLIAM HOPPER, R. H. GRATZ, HENRY CARTWRIGHT, RICHARD MERRIFIELD.
THOMAS C. HOPPER, *Superintendent at Philadelphia.*

This Company is now prepared to furnish WET AND DRY GAS METERS, STATION METERS, GOVERNORS, PRESSURE INDICATORS AND REGISTERS, SERVICE and METER COCKS, and all other articles in their line appertaining to the use of Gas-Works.

The combination of Mechanical and Scientific Skill, and the long experience of the several members of the Company, is a sure guarantee of durability, accuracy and excellence of workmanship. Orders addressed

AMERICAN METER COMPANY,

West Twenty Second Street, New York. Arch and Twenty-Second Streets, Philadelphia. No. 23 West Street, Boston will meet with prompt attention.

HARRIS & BROTHER,

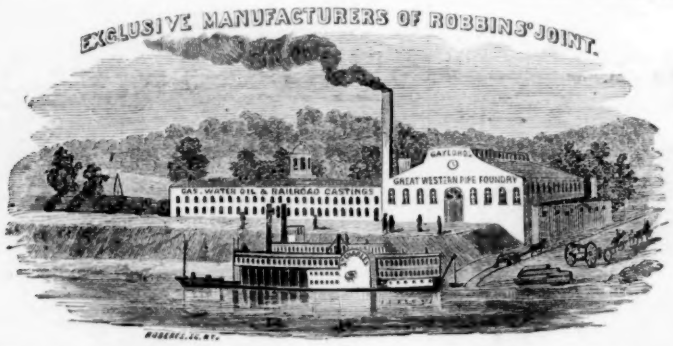
Practical Gas Meter Manufacturers,

Continue as heretofore at the OLD ESTABLISHMENT, Nos. 1115 and 1117 Cherry Street, Philadelphia,

To manufacture Wet and Dry Gas Meters, Station Meters, Experimental Meters, Meter Provers, Centre Seals, Governors, Pressure Registers, Guages, Indicators, Photometers, and all kind of Gas Apparatus; also furnish all other Articles appertaining to the use of Gas Works.

From our long Practical Experience of the Business (covering a period of 20 years) and from our personal supervision of all Work, we can guarantee all orders to be executed promptly, and in every respect satisfactorily.

J. Wesley Harris, Washington Harris, Wm. Wallace Goodwin



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Great Western Pipe Foundry.

EXCLUSIVE MANUFACTURERS OF ROBBINS' JOINT.

Manufacturers of Gas, Water, Oil and Railroad Castings.

T. G. GAYLORD & CO.,

Office Nos. 90 and 92 Broadway,
Cincinnati, Ohio.

T. G. Gaylord,
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GROVESTEIN & CO.,

PIANO FORTE MANUFACTURERS,

499 BROADWAY, NEW YORK.

THE ATTENTION of the public and the trade is invited to our New Scale, Seven Octave, Rosewood Piano Fortes, which for volume and purity of tone are unrivalled by any that have hitherto offered in this market. They contain all the modern improvements, French Grand Action, Harp Pedal, Iron Frame, Over-strung Bass, etc., and each instrument, being made under the supervision of Mr. J. H. Grovesteen, who has had a practical experience of over thirty years in their manufacture, is fully warranted in every particular.

THE "GROVESTEEN PIANO-FORTE"
RECEIVED THE HIGHEST PREMIUM AT THE
CELEBRATED WORLD'S FAIR.

Where were exhibited instruments from the best makers of London, Paris, Germany, Philadelphia, Baltimore, Boston, and New York; and also at the American Institute for five successive years, the gold and silver medals from both of which can be seen at our warerooms.

By the introduction of improvement we make a still more perfect Piano-Forte, and by manufacturing largely, with a strictly cash system, are enabled to offer these instruments at a price which will preclude all competition.

PRICES

No. 1,	Seven Octave, round corners,	Rosewood,	Plain Case,	$300
No. 2,	"	"	" Heavy Moulding	325
No. 3,	"	"	" Louis XIV style	350

a fac-simile of the accompanying cut.

TERMS—Net Cash, in current funds Descriptive circular sent free on application.

THE AUBIN BALANCED

VALVE WATER METER,

(Used also for Oils and Liquors)

Is now in use by many City Water Cos., because of its low price, simplicity, durability, accuracy under any pressure, and (a great advantage) because it runs with less head than any meter used. Manufactured by H. Q. HAWLEY, Albany, N. Y.

MORRIS, TASKER & CO,

PASCAL IRON WORKS

[ESTABLISHED 1821,]

PHILADELPHIA,

Manufacture Wrought Iron Welded Tubes for Gas, Steam or Water; Lap-Welded Boiler Flues, Galvanized Wrought Iron Tubes,

ARTESIAN WELL PIPES,

of Wrought or Cast-Iron, screwed together, flush inside and out; Gas-works Castings, Retorts and Bench Castings for Coal Gas-works,; Cast-Iron Street Mains, Bends, Branches, Drips, &c.

Gas and Steam Fitters' Tools, &c.

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SOUTHWARK FOUNDRY,

FIFTH & WASHINGTON STREETS,

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MERRICK & SONS, Engineers,

MANUFACTURERS OF EVERY DESCRIPTION OF GAS MACHINERY.

Retorts, Bench Castings, Condensers, Washers, Scrubbers, Wet or Dry Lime Purifiers, Coke Wagons, Fire Tools, Wrought Iron Grate Bars, Gasholders, either Telescopic or Single, with Suspension Frames complete; Wrought Iron Roof Frames, for Iron or Slate; Stop Cocks, Exhausters, Steam Pumps, Boilers and Tanks, Steam or Hand Air Pumps for proving Street Mains, Centre Seals, Governors, Wrought or Cast-Iron, Line Sieves for Purifiers, Hoisting Machines for Lifting Purifier Covers.

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S. FULTON & CO.,

(Successors to Colwell & Co.)

Manufacturers of

PIG IRON & CAST IRON GAS & WATER PIPES.

Also, Heavy & Light Castings of every description, No. 207 North Water street and 206 North Wharves, Philadelphia.

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TO GAS COMPANIES.

THE UNDERSIGNED DESIRES TO undertake the supervision of several small Gas-works, to visit and examine them as often as may be necessary; to obtain and inspect their coal, castings, fire-brick, and other materials; and to manage their general business in such a manner that they shall be under such supervision as is now attainable in large works, at much increased cost. Also, to advise as general Consulting Engineer and expert in practical chemistry.

CHAS. M. CRESSON,
Late Asst. Engineer of the Philadelphia Gas-works
417 Walnut st., Philadelphia.

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NEW PATENT

GAS APPARATUS

For Country Residences, Public Buildings, &c.,

FROM $300 UPWARDS.

EVERY DESCRIPTION OF GAS FIXTURES.

Gas Fitting in all its banches

591 Broadway,
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Steam Pump Manufacturing Company,

MNUFACTURERS OF THE WOODWARD PATENT IMPROVED

SAFETY STEAM PUMP,

—Adapted for Mining and Fire Purposes—and

Steam, Water & Gas Fittings of All Kinds

Also, Wholesale and Retail Dealers in WROUGHT IRON PIPE, BOILER TUBES, etc.,

Woodward Building, 76 and 78 Centre Street,

corner of Worth street, formerly 77 Beekman Street, *New York.*

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OPPOSITION LINE.

TO CALIFORNIA VIA NICARAGUA

SAILING EVERY TWENTY DAYS,

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On the Atlantic Ocean.	On the Pacific Ocean.
Santiago De Cuba.	America.
San Francisco.	Moses Taylor.
Dakota.	Nevada.

PASSAGE AND FREIGHT AT REDUCED RATES.

Sailing days from New York. 1867.

February 20th, March 10th and30th.
" April 20th, May 10th and 30th.

And so on at intervals of twenty days, leaving on the Saturday previous, when a regular sailing day comes on Sunday.

For further information, apply at the Company's office, 177 West-st., corner Warren-st., New York.

66tf D. N. CARRINGTON, Agt.

R. D. WOOD & CO.,

MANUFACTURERS OF

CAST-IRON PIPE, RETORTS, &c.

Office, 400 Chestnut Street,

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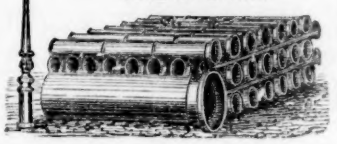

FINKLE & LYON'S

New Family

SEWING MACHINE

Should be known in

IN EVERY TOWN.

To accomplish this at once and save the expense of a *Travelling Agent*, we offer thus, viz:

Any one sending us orders for two machines shall receive one machine free of charge. This proposition cannot avail after we have appointed a local agent in the town.

We have now completed our *new manufacture* at a cost of some $200,000—introducing *new patents*, and such important improvements, that without fear we are able to offer the following stringent guarantee, viz: After a fair trial, if any purchaser does not prefer the Finkle & Lyon Family Sewing Machine to any other, he can return it and have back his money.

This machine has taken many of the highest prizes; *is less complicated than any other first class machine; does a wider range of work without changing; requires no taking apart to clean or oil, no "lessons" to set needle, regulate tension or operate machine.*

Our new Manufacturing Machine is sold on the same terms as the Family Machine.

Please send for a circular with samples of sewing.

Finkle & Lyon S. M. Co.

No. 581 BROADWAY, NEW YORK.

Great Improvement

IN

Sewing Machines.

EMPIRE

SHUTTLE MACHINE!

Patented February 14th, 1860.

Salsroom, 536 Broadway.

This Machine is constructed on entirely new principles of mechanism, possessing many rare and valuable improvements, having been examined by the most profound experts, and pronounced to be SIMPLICITY and PERFECTION COMBINED.

It has a straight needle, perpendicular action, makes the LOCK or SHUTTLE STITCH, which will NEITHER RIP nor RAVEL, and is alike on both sides; performs perfect sewing on every description of material, from Leather to the finest Nansook Muslin, with cotton, linen, or silk thread, from the coarsest to the finest numbers.

Having neither CAM nor COG WHEEL, and the least possible friction, it runs as smooth as glass, and is

Emphatically a Noiseless Machine!

PRICE OF MACHINES,

COMPLETE:

No. 1, Family Machine, with Hemmer, Feller, Gauge, Braider, & Corder, complete. - - - $60
No. 2 Small Manufacturing, with Extension Table, $75
No. 3. Large Manufacturing, with Extension Table, $85
No 3. Large Manufacturing, for Leather, with Rolling Foot and Oil Cup, 100

One-half hour's instructions is sufficient to enable any person to work this Machine to their entire satisfaction.

Agents Wanted in all Towns in the United States, where Agents are not already established. Also, for Cuba, Mexico, Central and South America, to whom a liberal discount will be given Terms, invariably Cash on delivery.

T. J. McARTHUR & CO.,

536 Broadway.

GAS-BURNERS.

WIGHTMAN BROS.,

IMPORTERS AND

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For the United States and Canada, of

SCHWARZ'S

GERMAN LAVA GAS-TIPS

And proprietors of Winchester's Improved

LAVA TIP GAS BURNERS,

No. 25 Kilby Street,

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T. G. ARNOLD,

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And Importer of Scotch Tips,

336 and 338 West 21st street,

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Mercury Cups, Portable Sockets, Burner Pillars, Burner Pliers, &c., &c.

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GAS-BURNERS,

For Lighting and Heating Purposes.

Gas Heating and Cooking Apparatus; Fitters' Proving Apparatus, &c.

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NEW SYSTEM OF

VENTILATION,

BY

HENRY A. GOUGE.

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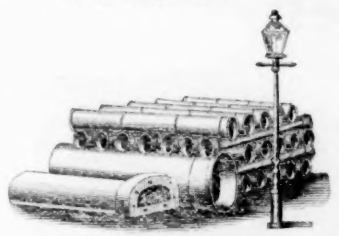
Henry A. Gouge,
173 254 Broadway, New York.

LOUISVILLE PIPE WORKS.

Dennis Long, Proprietor.



Cast Iron Gas and Water Pipe of All Sizes Always on Hand.

Retorts.

STOP-VALVES, AND ALL APPURTENANCES FOR EITHER GAS OR WATER WORKS.

All Pipe, &c., Made of the Very Latest Pattern and Improvements.

ALSO MANUFACTURER OF

Steamboat, Portable and Stationery

STEAM ENGINES.

Flour and Saw Mill Machinery—Portable Circular Saw Mills, Shafting, Pulleys, &c, &c.

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Cor. 9th and Water streets, Louisville, Ky.

EMPIRE LINE

FOR SAVANNAH, GA.

Every Saturday, the elegant Side-Wheel Steamships

SAN SALVADOR,

Commander, Joshua Atkins, and

SAN JACINTO,

Commander, Winslow Loveland.

Every SATURDAY, from pier 13 N. R.

Have been placed on the route to Savannah by the Atlantic Mail Steamship Company of New York, and are intended to be run by them in a manner to meet the first class requirements of the trade. The cabin accommodations of these ships are not excelled by any Steamers on the coast, and although their carrying capacity is large, their draught of water enables them to insure a passage without detention in the river

San Jacinto,	Saturday, Oct.		6
San Salvador,	..	"	13
San Jacinto,	..	"	20
San Salvador,	..	"	27
San Jacinto	Saturday, Nov.		3
San Salvador	..	"	10
San Jacinto	..	"	17
San Salvador,	.	"	24

Returning, leave Savannah every Saturday at 3 o'clock, P. M.

Bills of Lading furnished and signed on the Pier.

For further particulars, engagement of Freight or passage, apply to

GARRISON & ALLEN, Agents,
No. 5 Bowling Green.

Agent at Savannah, B. H. HARDEE.

—The oil refiners of Pennsylvania are greatly exercised by the introduction into the State Legislature of a bill providing for the inspection of all petroleum and kerosene oils at the city of Philadelphia, in order to ascertain the burning test. The peculiar feature of this bill, however, is that it will necessitate the appointment of an inspector, whose term of office will extend over four years, and whose pay will be derived from a tax of ten cents to be collected off each package. The oil refiners say that the tax provided in the bill would ruin their business.

—Good words and good deeds are the rent we owe for the air we breathe.

—Gold is a deaf and dumb villain that seduces more men and women than all other rascals put together.

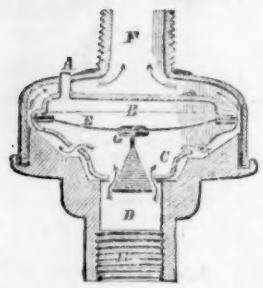
—Shutters are very useful rnd respectable in their way, but when young men are carried home on them at a late hour of the night, it indicates a perversion of both shutter and broadcloth.

—A ladies' shoemaker advertises himself as one of the luminaries of the "sole her system.

Thompson's Automatic Gas Controller

This Controller has been improved until it would seem nothing more perfect can be desired. It works upon a simple and well-known principle in mechanics, whereby the variation in pressure in the service pipe, acts upon a valve to check the flow at the burner, or open it, as the case may be. This insures a steady flow, a uniform consumption of gas, and a regular and economical light.

The lower cut shows the construction. The conical valve, at G, is attached to the elastic diaphragm, E. As the gas enters in the directions shown by the arrows the diaphraghm, E, is acted upon according to the pressure, and tends to close the valve upon its seat. When the pressure decreases, the weight of the valve opens it again. The chamber, B, of the inner case



above the diaphragm, communicates with the air by the orifice, A. Hence, the air only balances the gas below the diaphragm, and makes it very sensitive to any variation in the gas pressure, which operates the valve, and, accordingly, regulates the flow to the burner.

This is the most useful thing to regulate the pressure in street lamps we know of, and for every other place where gas is burned for lighting purposes. It saves from 25 to 60 per cent., according to the pressure in the mains.

For sale by C. M. Simpson, 22 Pine-street, N. Y.

Miscellaneous Items.

—Petroleum is bleached by shaking it successively and repeatedly with oil of vitriol, and then with a strong solution of caustic soda, allowing the oil to separate each time,

—The experiment of making belting from paper has proved a success in the hands of Crane & Co at Dalton, Mass., and the article is now used in all their own mills and several other manufacturing establishments. The belting resembles the genuine oak tanned leather, and serves alike well in a dry or damp atmosphere.

—F. Landauer has produced a new compound (double sesquichloride of iron and sodium) by the action of hydrochloric acid on artificial ultramarine. By writing upon paper with the solution and afterward warming it, the letters become black, just as in the case of some sympathetic inks, but the writing does not disappear by the action of water.

—A German engineer states that oxide of chromium is the best substance for polishing steel. The article can easily be prepared by heating bi-chromate of potash to redness. It is also used for painting on porcelain. One equivalent of chromic acid is reduced to oxide of chromium, and on well washing the residue of the ignition, neutral chromate of potash is washed away, and the ignition is left behind.

—A new automatic car-coupler, exhibited at Cincinnati, is said to obviate all the risks of injury to trainmen, which at present result often in fatal disasters. By the new contrivance, which is as simple as ingenious, the cars are made to couple themselves, and where it is in use no brakeman or other person need go between the cars for the purpose of making or breaking the attachment.

—Fine samples of the mineral dialogite or native carbonate of manganese are found in the present face of the Tarshish main tunnel, and also in the incline; that in the latter being found in connection with the silver sulphurets and and forming very beautiful cabinet specimens. The mineral is of a rose-red color and of peculiar crystaline form.

—The entire amount of gold in the world at the present time is estimated at about $5,950,000,000 in value. If melted together it would make a lump of 660 cubic yards. If beaten out into gold leaf it would cover an area of about 10,000 square miles, a tract 100 miles square, less than the extent of Vermont, and little more than a fifth of either New York or Pennsylvania.

—It is said that omnibus signals have been introduced into Springfield, Mass., by which those who want to ride can communicate their wishes to the drivers. The character of the signals is not given, but anything would be preferable to the want of means of communication between passengers and driver now the rule in New York coaches.

—The velocity of steam, when flowing into a vacuum is about 1,350 feet per second, when at an expansive power equal to the atmosphere; but when at ten atmospheres the velocity is increased to 1,780 feet; and when flowing into the air under the latter pressure it is only about 650 feet per second.

—Mr. Z. W. Chase, while prospecting in Colorado during last year discovered, near Breckinridge, Summit county, a silver lode, bearing galena. He states that the vein is about six feet in width, and that an average sample of the ore analyzed by Dr. Charles T. Jackson, contained a little over three per cent. of the metal thallium.

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☞ In looking for advertisements, see figures 1 to 9, within brackets, at head of advertisement pages.

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Automatic Gas Purifier—State Rights for sale—Wm. C. Turnbull, care of T. C. Babcock, 59 Broadway, or office of the American Gas-Light Journal ... 2
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Gasoleine,—J. W. Wheelock, 284 Pearl st., New York ... 4
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MINING MACHINERY, ETC.

Broker in Mining Stocks—C. H. Smith 5½ Pine st. New York ... 4
Industrial Chemistry—Prof. H. Dussauce, New Lebanon, N. Y. 2
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LAMPS, STOVES, PETROLEUM, ETC.

Lamps—F. H. Lovell & Co 233 Pearl street, New York ... 7
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